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HOMOGENEOUS X RADIATION IN BIOLOGICAL EXPERIMENTS.

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Summary.

SINCE the failure of certain experimenters to obtain evidence of a selective biological action depending upon the wave-length of the X rays applied has been attributed to the use of insufficiently homogeneous X ray beams, the methods of obtaining homogeneous radiation for biological purposes have been examined.

The factors introducing inhomogeneity in spectrometer methods are briefly discussed; some of these have not been considered when claims as to the homogeneity of the beams used have been made.

The methods of obtaining homogeneous radiation by the use of selective filters is described, and it is shown that the method is successful only when sufficient filter thicknesses are employed. In some cases, an insufficient filter thickness has been used.

It is believed by the writer that a very rigid examination of the degree of inhomogeneity of a beam used in a biological experiment should be made before the conclusions drawn from the experiment are held invalid on this ground.

Introduction.

Recently there have been published reports of investigations by Goulston,[1] Scott[2] and Duthie[3] on the action of homogeneous X radiation on the chorio-allantoic membrane of hen eggs which do not confirm the observations of Moppett,[4][5] that particular reactions are associated with particular wave-lengths. In a criticism of the work of Scott, Moppett[6] states that the failure of Scott to con-

firm his observations "appears to be due to the fact that he used the whole *K* series of tungsten, a radiation of unsuitable wave-length and insufficient homogeneity". In a discussion of the work of Moppett at the Fifth Australian Cancer Conference at Canberra, Dr. W. H. Love stated that the failure of Scott to obtain a selective action with wave-length was due to the use of an X ray beam of unsatisfactory homogeneity. The success of some biological experiments appears therefore to depend very definitely upon the degree of homogeneity of the radiation used, and I have thought it of interest to examine the methods which have been used by these workers to obtain beams of homogeneous X radiation. A consideration of the physical aspects is possibly the more desirable since in general these investigations have been reported in journals devoted more particularly to biological and medical subjects, and they are therefore less likely to have come under the notice of physicists who have made a special study of X rays. Such an examination is possibly further desirable since biological and medical readers are likely to accept without question claims made as to the homogeneity of X ray beams used in biological experiments.

Nature of the Primary X Ray Beam.

The radiation from an X ray tube is a heterogeneous beam consisting of a continuous spectrum upon which is superimposed a characteristic spectrum made up of a number of spectral lines. The continuous spectrum extends from a short wave-length limit, which is determined by the voltage, to the longest wave-lengths which can pass through the tube walls. The maximum energy of the continuous spectrum occurs at a wave-length of from 1·3 to 1·5 times the minimum wave-length, depending upon the applied voltage and the extent to which the beam suffers absorption in leaving the tube. The total energy is dependent upon the atomic number of the target of the X ray tube, and increases rapidly with voltage. The lines of the characteristic spectra occur at certain definite wave-length positions, depending upon the emitting element, and the lines of the different series of any element are excited only when the voltage exceeds certain definite values. The intensity of any line increases rapidly with increase of potential above that value necessary for its excitation.[7]

The majority of the energy of an X ray beam is distributed thoughout the continuous spectrum. For X ray tubes with targets of low atomic number, the intensity of a spectral line may be many times that of the same width of continuous spectrum near to it; but with increase of atomic number of the target material, the intensity of the line becomes nearly equal to that of a nearby strip of continuous spectrum of the same width.[8]

Methods of Obtaining Homogeneous Radiations.

In the biological experiments, two different methods have been employed in selecting a beam containing a more or less narrow range of wave-lengths from the heterogeneous beam produced in the X ray tube.

The Spectrometer Method.

In the spectrometer method the principle that X rays of various wave-lengths are reflected from the cleavage face of a crystal at definite angles has been utilized. When a beam of heterogeneous X rays is incident on the face of a crystal at an angle θ, then one particular wave-length λ is reflected, λ being given by $n\lambda = 2d \sin \theta$, where d is the distance between the atomic planes in the crystal, and n is an integer showing the order of spectrum. To select a particular wave-length, therefore, the crystal must be adjusted at the correct angle to the incident beam, and the selecting slit adjusted to receive the reflected beam. Since in practice even a narrow beam is not incident on a crystal at one angle only, but over a small range of angles, a number of adjacent wave-lengths will be reflected. The width of the wave-length range selected depends upon the width of the slits defining the incident beam of X rays and of that permitting the passage of the selected radiation, as well as upon the dimensions of the spectrometer system and the position of the target of the X ray tube. For the selection of approximately monochromatic radiation, narrow slits of the order of one or two tenths of a millimetre in width must be used. If, in order to obtain beams of reasonable intensity for biological experiments, much wider defining and selecting slits are used, there is a consequent increase in the wave-length range of the reflected rays.

The selected beam may further be rendered more inhomogeneous by the inclusion of higher order spectra and of scattered radiation. The presence of radiation of a higher order is determined by the maximum voltage applied to the tube, and by the angle at which the selected radiation is reflected. Higher order spectra will be included if the applied voltage is sufficiently high to excite wave-lengths short enough to satisfy the equation given above for values of n greater than 1, and it is therefore possible to exclude higher order radiation by a suitable choice of voltage. The passage through the defining slit of radiation scattered from the slits, crystal and other portions of the spectrometer can have a very disturbing effect on the homogeneity, since practically the whole range of wave-lengths present in the incident beam can be included. With slit widths of one millimetre or more, the intensity of the scattered radiation may approach or even exceed that of the reflected radiation (particularly if this is being selected from a weak portion of the continuous radiation) and even with narrow slits special precautions are necessary to exclude scattered radiation.[9]

In their experiments, Moppett, Scott and Duthie have all used recognized forms of crystal spectrometers with slits of two or three millimetres in width, and no special precautions appear to have been taken to eliminate radiation scattered from various portions of the spectrometer system. In

Scott's experiments, the voltage was not sufficient to allow the inclusion of a second order spectrum, while in those of the other two workers second or even higher order spectra could have been included.

In some of his experiments on the allantoic membrane, Moppett has used the radiations from a multiple crystal spectrometer. Even when using slits of the same width as with a single crystal, in this arrangement the homogeneity of the selected beam would appear to be less than that from a single crystal spectrometer as a result of: (*a*) the use of what are essentially curved slits giving a greater range of possible angles of incidence; (*b*) the difficulty of arranging the cleavage faces of the several crystals so that the X ray beam is incident on each crystal at exactly the same angle; and (*c*) the greatly increased opportunity for the inclusion of scattered radiation of a wide range of wave-lengths.

The most satisfactory method of investigating the degree of homogeneity of the selected X ray beam is to analyse it with a crystal spectrograph. The proportion of the energy of the beam concentrated in any definite wave-length range, as well as the total range of wave-lengths, can then be determined. Unless this is done, no very definite conclusions can be drawn as to the relative degrees of inhomogeneity of the beams used by different workers, and in experiments, the results of which are definitely influenced by the degree of inhomogeneity, an analysis of the beam using a spectrograph carefully designed to exclude scattered radiation appears to be essential.

Moppett has estimated the frequency range of the beam selected with his single crystal spectrometer to be about 8%, and that with the multiple crystal spectrometer about 20%. Details of these estimations, however, are not supplied, and the presence of scattered and higher order radiations does not appear to have been taken into account. From the data given in the papers, it is not possible to make any accurate calculations of the frequency range of the beams used by the different workers. Scott claims to have used the *K* radiations of tungsten, ranging from 214 to 179 X.U.[1] and involving a frequency range of approximately 20%, comparable with that estimated by Moppett for his multiple crystal spectrometer.

The Absorption Method.

Moppett has also used, in a number of investigations on tissues, radiations from an X ray tube with a layer of uranium[5][10][11] on the target. In this tube, the cathode rays were directed upon a thin layer of uranium rubbed into a copper plate, and the X rays produced passed through the uranium, the copper plate of one millimetre thickness, and about one centimetre of water. In its passage through these filters, it was claimed that the continuous radiation and the uranium *L* series lines were absorbed, leaving only the *K* series lines, which were used as "homogeneous" radiations in biological experiments. It is further stated that the degree of homogeneity of this radiation approaches that obtained with the spectrometer methods used previously. It is therefore of interest to examine the details of the absorption method, since the degree of homogeneity attained can be deduced by calculation, using elementary theory.

In this method, the uranium filter will absorb continuous radiations of wave-length longer than and including that of its *K* characteristic lines according to the (wave-length)^3 law of general absorption, and those of wave-length shorter than its *K* critical absorption edge by selective absorption. If a sufficient thickness of uranium is used, the transmitted beam will consist principally of uranium *K* lines, which cover a wave-length range from 108 to 131 X.U., together with continuous radiation within this range.

In his tube, Moppett used a thickness of 0·01 millimetre of uranium, which served the dual purpose of target of the X ray tube and of selective filter, and an approximately constant potential of 140 kilovolts was applied. It is possible, using the Thomson-Whiddington law, to calculate the thickness of uranium necessary to reduce the electron velocity due to this voltage to a value which is no longer sufficient to excite the *K* series radiation. Provided that the electrons travelled in straight lines through the uranium, this thickness would be 0·016 millimetre. The work of Williams[12] indicates that, when the tortuous path of the electrons through the metal is considered, a thickness of 70% of this amount (that is, 0·011 millimetre) is sufficient. The thickness of uranium in the tube, therefore, does not appear to have been greater than that necessary for the maximum excitation of the *K* radiations, and the thickness of uranium available to serve as a filter would be considerably less than 0·01 millimetre.

The stoppage of the electrons in the uranium and underlying copper would give rise to a continuous spectrum with a minimum wave-length of about 88 X.U., and a wave-length of maximum energy at about 125 X.U. It is possible to calculate[1] the decrease in intensity of the various wave-lengths due to absorption in the filter materials. In Table I the percentage intensity of wave-lengths between 90 and 200 X.U. remaining in the beam after passage through 0·01 millimetre of uranium, 1 millimetre of copper and 1 centimetre of water respectively is shown. In the last column is given the percentage intensity transmitted by the three filters in series. It is evident that there still remain appreciable intensities of wave-lengths between 90 and 180 X.U.

The voltage applied to the tube was approximately that required to cause the maximum of the continuous radiation to fall close to the *K* series characteristic radiation. Under these conditions,

[1] The sign X.U. indicates one-thousandth of an Angström unit.

[1] Some values of the absorption coefficients were obtained from the International Critical Tables, page 15; others were obtained by extrapolation from those given in the tables for neighbouring elements.

and with targets of high atomic number, the energy contained in the continuous spectrum on each side of the characteristic lines is quite considerable[8] compared with that of the characteristic lines themselves. For this reason, the transmission of appreciable percentages of the intensities of wave-lengths on each side of the characteristic lines indicates the presence in the filtered radiation of a considerable range of wave-lengths.

TABLE I.

Percentage intensities of different wave-lengths transmitted through 0·01 millimetre of uranium, 1·0 millimetre of copper, and 1·0 centimetre of water.

Wave-length. (X.U.)	μ/ρ.	Percentage transmitted through—			
		Uranium.	Copper.	Water.	All Three Filters.
		%	%	%	%
90	4·1	93	77	85	61
100	4·4	92	74	85	58
105	4·7	91	72	85	56
110	1·6	97	70	84	57
120	1·87	96	66	84	53
130	2·27	96	61	84	49
140	2·56	95	56	83	44
150	2·99	94	51	83	40
160	3·41	94	46	83	36
170	3·9	93	40	83	31
180	4·4	92	35	82	26
190	4·9	91	30	82	23
200	5·4	90	26	82	15

The extent to which the continuous spectrum is still present is shown in Figure I. The distribution of energy in the continuous spectrum of an unfiltered beam for an excitation potential of 140 kilovolts constant potential is shown in curve *A*;[1]

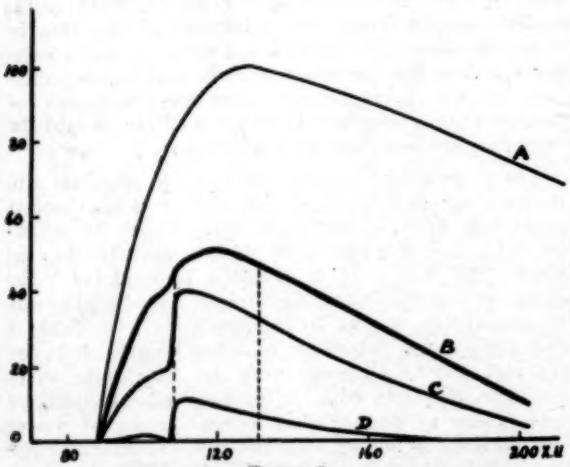

FIGURE I.

Energy distribution in the continuous spectrum excited in the uranium tube; A, the unfiltered beam; B, C and D, the beams filtered through 0·01, 0·1 and 0·5 millimetre of uranium respectively, in addition to 1 millimetre of copper and 1 centimetre of water in each case. The dotted lines indicate the range of the *K* lines of uranium.

the characteristic lines of uranium are not shown, but they would be represented by narrow peaks occurring at 131, 126, 112 and 108 X.U. Curve *B* represents the distribution of the beam after filtration through 0·01 millimetre of uranium, 1 millimetre of copper and 1 centimetre of water. The wave-length range of the *K* radiations is shown by the dotted lines. It is obvious that a considerable amount of energy associated with wave-lengths outside this range is transmitted through these filters; in the actual experiment, when the same thickness of uranium could not have acted both as target material and as filter, the curve representing the beam used would lie intermediate between curves *A* and *B*. It appears, therefore, that the beam used for the biological experiments would contain a much wider range of wave-lengths than was claimed.

The remaining curves in Figure I illustrate the way in which selective absorption reduces the short wave-length continuous radiation when a greater filter thickness is employed. Curves *C* and *D* show the distribution of energy with filters of 0·1 and 0·5 millimetre of uranium respectively, the copper and water filters remaining unchanged. It is evident that a thickness of uranium many times that used by Moppett is required before the shorter wave-lengths are rendered inappreciable.

It should be emphasized that the fact that the characteristic radiation has not been included in the curves does not affect this argument in any way. The four *K* lines of uranium would occur as very narrow peaks superimposed on the continuous spectrum within the range indicated by the dotted lines. It has been shown that, for the initial beam, the energy in the spectral lines is small compared with the energy of the continuous spectrum. Further, in passing through the filters, each spectral line will be reduced in intensity in the same proportion as the continuous radiation of the same wave-length.

From these theoretical considerations it would appear that the radiations would comprise a background of continuous radiation extending from 90 to at least 200 X.U., upon which would be superimposed a small amount of uranium *K* radiation. In the published descriptions of the tube, spectrum photographs of the radiation and microphotometer records of these photographs are reproduced. Since spectrum photographs lose much of their detail in a printed reproduction, it would be obviously unfair to consider them very carefully. The photometer records, however, suffer from no such disadvantage, and these alone will be considered. For convenience, these photometer records[1] have been reproduced in Figure II.

The first photometer record[8] (Figure IIA) confirms the conclusions already arrived at above regarding the nature of the filtered radiation. There is definite evidence of a continuous radiation

[1] I have to thank Mr. A. H. Turner, M.Sc., for calculating the form of the unfiltered energy distribution curves shown in Figures I, III and IV.

[1] It should be noticed that the curves in Figure II are not exactly equivalent to those in Figure I. In the latter, the intensity is plotted against the wave-length. The curves shown in Figure II are photometer records, in which the vertical displacement represents the intensity of the light from the photometer lamp which is transmitted through the spectrum photograph. From the photometer record, the photographic density at various places in the spectrum can be calculated, and an intensity wave-length curve similar to those in Figure I can be deduced. Sufficient information is not given concerning the photometer records to enable the actual intensity curves to be constructed.

extending from 90 X.U. to beyond 200 X.U., with a maximum intensity at about 120 X.U. The *K* lines of uranium, which should occur at about 110 and 130 X.U., cannot be recognized with any certainty. The

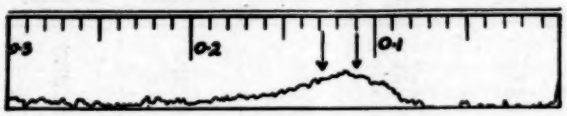

FIGURE IIA.

Microphotometer record of spectrum photographs of radiation from uranium tube. The positions of the α and β doublets are indicated by the arrows.

two other photometer records[5][11] (which closely resemble one another) are not at all easy to interpret. One of them is given in Figure IIB. It shows a band of intense radiation extending from about 100 X.U. to about 180 X.U. The maximum of the peak occurs at about 130 X.U., and a smaller peak at about 140 X.U.; these, however, do not correspond to the positions of the *K* α and β doublets of uranium. There is further no evidence of any peak in the second order where the intensity should be approximately 20% of that in the first. There does not therefore appear to be any theoretical or experimental evidence in support of the claim that this tube emits only the *K* lines of uranium; on the contrary, there is evidence of both kinds that an appreciable continuous spectrum, covering a considerable range of wave-lengths both shorter and longer than the uranium *K* series, is present.

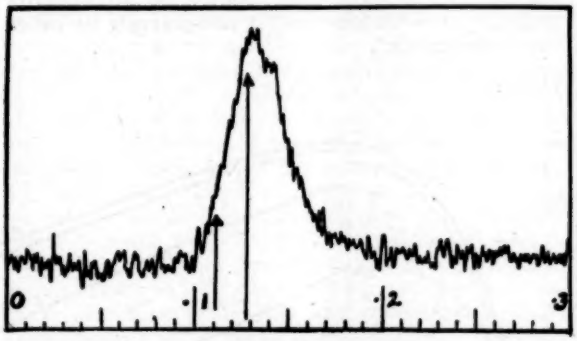

FIGURE IIB.

Microphotometer record of spectrum photographs of radiation from uranium tube. The positions of the α and β doublets are indicated by the arrows.

It should be stated here that the writer, when the paper describing this tube first came under his notice more than two years ago, communicated the conclusions arrived at above to Dr. Moppett. He at that time assured the writer that the tube gave just the type of radiations he wanted. Further, it was stated in the paper describing the tube, and again recently,[13] that experiments with the allantoic membrane have shown that a rigid standard of homogeneity was not essential. If, therefore, the radiations from the uranium tube can be regarded as "homogeneous", a very careful examination indeed of the degree of homogeneity of the beams used, not only by other workers, but by Dr. Moppett himself, would appear to be desirable before any observations could be held invalid on the ground that insufficiently homogeneous radiation was used.

In a physical and mathematical study of mitotic activity, Love[14] has also employed the filtration method in two different ways to produce "homogeneous" radiation. In the first method, the radiation from an ordinary X ray tube with a tungsten target was filtered through a combination filter consisting of 0·1 millimetre of tungsten and 3 millimetres of aluminium, it being claimed that in this way a beam of approximately homogeneous radiation was obtained. The principle of this method is the same as in the case of the uranium target, the short wave-length continuous radiation being selectively absorbed in the tungsten filter. The tube was operated at 90 kilovolts; the short wave-length limit of the continuous radiation would therefore be at about 140 X.U., and the maximum energy at about 200 X.U. The *K*α doublet of tungsten occurs at 210 X.U., the β doublet at 180 X.U., and the absorption edge at 178 X.U.

In Table II the percentage intensity transmitted through the filters for a number of wave-lengths in the continuous beam is shown. In the second column is shown the percentage transmission for the tungsten alone, in the third for the aluminium alone, and in the last for the two filters in combination. It should be noticed that the aluminium filter produces a slightly greater percentage decrease in the *K* radiation than in the short wave-length continuous radiation; in other words, for the elimination of the short wave-length continuous radiation, a sufficient thickness of the selective absorber must be used, and any deficiency in this respect cannot be compensated for by a greater thickness of a non-selective absorber.

TABLE II.

Percentage intensities of different wave-lengths transmitted through 0·1 millimetre of tungsten and 3·0 millimetres of aluminium.

Wave-length. (X.U.)	Percentage transmitted through—		
	Tungsten.	Aluminium.	Both Filters.
	%	%	%
140	28	85	24
160	19	84	16
180	60	83	50
200	52	80	41
220	45	78	35
240	37	76	28
260	30	72	22
280	24	67	16
300	19	65	12

The manner in which the intensity of the various wave-lengths is reduced by the combined filter is shown in curves *A* and *B* in Figure III. It will be seen that the energy of the filtered beam is much more closely concentrated around about 190 X.U. than in the unfiltered beam, but there is still an appreciable fraction of energy distributed in wave-lengths from 160 to 280 X.U. The increased concentration of the energy in a narrowing wave-length range with increased filtration is shown in

curve *C*, which represents a filtration of 0·2 millimetre of tungsten and 3 millimetres of aluminium.

The curve *B*, with the four K lines of tungsten superimposed, represents the beam used in one portion of Love's experiments; this beam has been considered "approximately homogeneous".

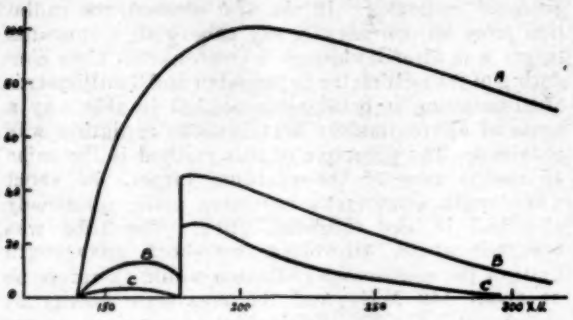

FIGURE III.

Energy distribution in the continuous spectrum due to tungsten and aluminium filters; A, the unfiltered beam; B and C, beams filtered through 0·1 and 0·2 millimetre of tungsten respectively, in addition to 3 millimetres of aluminium.

For the majority of the experiments, Love has used as a filter material an element, the critical absorption wave-length of which (at 190 X.U.) lies between the $K\alpha$ and β doublets of the target element. The radiation from a tube with a tungsten target operated at 95 kilovolts was filtered through a sheet of paper in the surface of which hafnium oxide had been well rubbed; no mention is made of any other filter. It was claimed in this case that the $K\alpha$ lines of tungsten ("monochromatic" radiation) were transmitted freely, the other frequencies being largely suppressed. It would appear that this beam was considered more homogeneous than that obtained with the tungsten filter, with which the β lines suffer no such selective absorption. It was further stated that the use of monochromatic radiation was likely to enhance the possibilities of correlation and interpretation of the experimental results.

No indication is given as to the thickness of hafnium used; the thickness of a sheet of ordinary paper varies from about 0·05 to 0·12 millimetre, and it is difficult to attach any great thickness of a powdered material to paper by rubbing. I have found that by rubbing a lead salt into both sides of a piece of paper of medium texture, a thickness of lead of the order of 0·005 millimetre can be obtained, and this thickness cannot be greatly increased even by impregnating a sheet of ordinary paper with a saturated solution of the lead salt. It is probable, therefore, that the thickness of the hafnium filter was about 0·005 millimetre.

In Table III the percentage intensity for a series of wave-lengths transmitted by filters of 0·005, 0·05 and 0·2 millimetre of hafnium respectively is shown. The values of the absorption coefficient have been obtained by interpolation from those for elements of neighbouring atomic number.

TABLE III.

Percentage intensities of different wave-lengths transmitted through various thicknesses of hafnium.

Wave-length. (X.U.)	μ/ρ.	0·005 Millimetre.	0·05 Millimetre.	0·2 Millimetre.
		%	%	%
130	5·6	97	72	23
140	6·5	96	69	23
160	8·4	95	62	15
180	10·0	94	56	11
200	3·1	98	84	51
220	4·0	98	79	40
240	5·0	97	75	33
260	6·2	96	70	25
280	7·4	96	65	19
300	8·6	95	61	14

The effect of these three filter thicknesses upon the continuous radiation (curve *A*) excited by 95 kilovolts is shown in Figure IV. Curve *B* represents a filter thickness of 0·005 millimetre of hafnium, such as would be obtained by rubbing a powdered hafnium salt into paper. It is evident that the intensity distribution with such a filter is very little different from that in the unfiltered radiation. In curve *C* (filter thickness 0·05 millimetre) an appreciable reduction in the shorter wave-lengths has taken place, but it is obvious that, even for 0·2 millimetre (curve *D*), which is very much more than could be readily attached to a sheet of paper by rubbing, the beam contains a large percentage of the energy in a region outside the $K\alpha$ region of tungsten (indicated by the dotted lines). The hafnium-filtered beam actually used in the experiments does not appear to have been limited to any narrow range of wave-lengths, and it can scarcely be called "monochromatic".

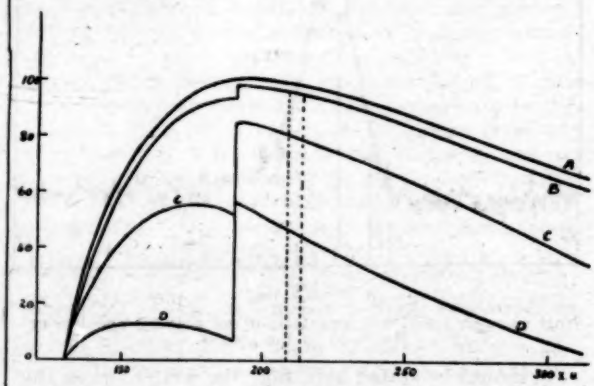

FIGURE IV.

Energy distribution in the continuous spectrum due to hafnium filter; A, the unfiltered beam, B, C and D, beams filtered through 0·005, 0·05 and 0·2 millimetre of hafnium respectively. The dotted lines indicate the positions of the $K\alpha$ lines of tungsten.

Since, in his experiments, Love does not make any claim for a selective action with wave-length, it would appear possible that his general results are unaffected by the heterogeneity of the beam used. It would not, however, appear desirable to attach any undue significance to the use of the terms "homogeneous" or "monochromatic" in describing the radiation used in his experiments; and, for this reason, the claim that the physical conditions of the

experiments have been simplified by the use of monochromatic radiation does not appear to be justified.

Conclusions.

Since the intensity in any small wave-length range is always only a small portion of the total intensity of the X ray beam, it is inevitable that any method of selecting a narrow band of wave-lengths must give a beam of feeble intensity. It is desirable, therefore, to use X ray tubes specially designed to operate continuously with large currents. When the wave-length range required includes the characteristic lines of an element, it is an advantage, if possible, to use that element as the target material. If the wave-length range is to be selected by means of a crystal, then special care should be taken to exclude scattered radiation from the selecting slit, and the voltage should not exceed that necessary to excite second order radiation. If, in order to obtain beams of greater intensity, wide slits are used, then the wave-length range of the selected beam is increased considerably. The only satisfactory method of determining the homogeneity of such a beam is by analysis with a suitably designed crystal spectrograph.

If the filtration method of selecting a wave-length range is adopted, the necessary filter thickness can readily be calculated. The value of the voltage to be used should also be carefully selected in relation to the filter thickness, as the use of too high a voltage for any given filter thickness seriously affects the homogeneity of the beam.

If a narrow range of wave-lengths is to be used for biological experiments in which a specific action with wave-length is suspected, then it appears desirable that the actual range of wave-lengths as well as the distribution of energy within that range should be determined. The success of a physical-biological experiment can depend only upon the success with which both the physical and biological portions have been planned. A thesis of such a fundamental nature and with such wide practical implications as that of Dr. Moppett deserves the most careful investigation and presentation. The importance of this thesis surely justifies the most detailed description of the physical portions of the experiment as well as an unambiguous determination of the ranges of wave-lengths for which the various selective actions are claimed.

References.

(1) D. Goulston: "The Action of Beta-Radiations from Radium on the Chorio-Allantoic Membrane of the Chick Embryo", *The British Journal of Experimental Pathology*, Volume XIII, 1932, page 317.

(2) C. M. Scott: "The Biological Action of Homogeneous and Heterogeneous X-Rays", *Proceedings of the Royal Society*, B, Volume CXII, 1933, page 365.

(3) E. S. Duthie: "Experiments on the Chorio-Allantoic Membrane of the Chick Egg with regard to the Action of Homogeneous Radiation", *The British Journal of Radiology*, Volume VII, 1934, page 238.

(4) W. Moppett: "An Investigation of the Reactions of Animal Tissues Exposed to Monochromatic X-Rays of Different Wave-Lengths", THE MEDICAL JOURNAL OF AUSTRALIA, April 11, 1925, page 364; "The Differential Action of X-Rays on Tissue, Growth and Vitality", Parts I, II, III and IV, *Proceedings of the Royal Society*, B, Volume CV, 1929, page 402, Volume CVII, 1930, pages 293, 303 and 308; "The Reaction of Living Tissues to Homogeneous X-Radiation Produced by Crystal Diffraction", *Proceedings of the Royal Society*, B, Volume CVIII, 1931, page 503; "An Examination of the Validity of Conclusions Drawn from Experiments in which the Allantoic Membrane of the Chick is Exposed to X-Radiation", *Journal and Proceedings of the Royal Society of New South Wales*, Volume LXVI, 1933, page 434.

(5) W. Moppett: "The Differential Action of X-Rays in Relation to Tissue Growth and Vitality", Part VI, *Proceedings of the Royal Society*, B, Volume CX, 1932, page 172.

(6) W. Moppett: "X-Radiation and the Allantoic Membrane of the Embryo Chick", *Nature*, Volume CXXXII, 1933, page 483.

(7) C. E. Eddy and T. H. Laby: "Quantitative Analysis by X-Ray Spectroscopy", *Proceedings of the Royal Society*, Volume CXXVII, 1930, page 22.

(8) Unnewehr: "Energy of the Characteristic X-Radiation from Certain Metals", *The Physical Review*, Volume XXII, 1923, page 529.

(9) C. E. Eddy and T. H. Laby: "The Sensitivity of Atomic Analysis by X-Rays", *Proceedings of the Royal Society*, Volume CXXXV, 1932, page 637.

(10) W. Moppett: "The Construction of an Experimental X-Ray Tube to Furnish the Homogeneous *K* Radiations of Uranium", *The Journal of the Cancer Research Committee of the University of Sydney*, Volume II, 1930, page 147.

(11) W. Moppett: "Homogeneous X-Radiations and Living Tissues", 1932, page 78.

(12) E. J. Williams: "The Rate of Loss of Energy of Beta-Particles in Passing Through Matter", *Proceedings of the Royal Society*, Volume CXXX, 1931, page 310.

(13) W. Moppett: "The Significance of Results Obtained by Exposing the Allantoic Membrane of the Chick to Homogeneous X-Radiation", *The Journal of the Cancer Research Committee of the University of Sydney*, Volume V, 1934, page 202.

(14) W. H. Love: "The Mitotic Activity of Normal and Malignant Tissues and its Modification by X-Rays", *The Journal and Proceedings of the Royal Society of New South Wales*, Volume LXVI, 1933, page 56.

THE DIAGNOSIS AND TREATMENT OF INTRACRANIAL TUMOURS.[1]

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THE diagnosis and treatment of cerebral tumours have undergone very great improvement during the last ten or fifteen years. This improvement we owe principally to the remarkable work of Cushing and his associates, though the great work of Gordon Holmes and Head, at the National Hospital, Queen Square, must not be forgotten. The great advances in the study of the surgical pathology of cerebral tumours has raised the diagnosis and surgical treatment of this lesion from the depths of relative impotence to the heights of comparative success.

It must be borne in mind that tumours of the brain are very common; in fact, the brain appears to be peculiarly susceptible to neoplastic disease, and it ranks not only a close second to the uterus in this regard, but it is the site of almost a dozen individual types of tumour.

For adequate treatment early and accurate diagnosis is essential. The recent advances in the classification of tumours, and the recognition of certain syndromes associated with particular types of growth, have made it possible not only to localize the growth, but to foretell with some degree of confidence its pathological type.

The History.

The first essential in diagnosis is a complete and carefully taken history, special attention being paid to early symptoms and to the chronological order of their appearance. When the patient is

[1] Read at a meeting of the Queensland Branch of the British Medical Association on November 2, 1934.

first examined the classical triad of headache, vomiting and swollen disks is remarkable by its absence, though usually one at least of these symptoms occurs early.

Headache.

Headache is one of the most common symptoms, and any patient complaining of a persistent headache for which no adequate cause can be found, should be suspected of having a cerebral tumour until found otherwise. The headache, though important, is not usually of localizing value; in many cases, especially of parasagittal meningiomata, a tender area can be palpated on the skull over the tumour. The type of headache varies a great deal; it tends frequently to occur at night, sometimes awakening the patient. Occipital pain is very common in tumours of the posterior cranial fossa. In certain tumours affecting the chorioid plexus, in the foramen of Munro, a sudden frightfully acute pain is sometimes encountered, which disappears just as suddenly with change of position of the head. But many patients, especially those with frontal tumours, never complain of headache. Frontal headache may occur with tumours of the posterior cranial fossa.

Vomiting.

Vomiting again is a most important symptom and should never be regarded lightly. Almost all patients with cerebral tumours vomit at some time or another. The vomiting is not necessarily of the projectile type, and, contrary to what is usually taught, is frequently associated with nausea. In many cases nausea occurs without vomiting. The vomiting frequently follows the attacks of severe headache, especially in the so-called "cerebellar attacks".

Vomiting tends to occur early in the case of children suffering from cerebellar tumours, and is sometimes easily confounded with cyclical vomiting. It is relatively more common and of earlier occurrence in tumours of the posterior cranial fossa, but may also occur as an early and isolated symptom in tumours about the optic chiasma. Vomiting again may come on after going to bed, or first thing in the morning. Food may or may not be brought up.

Eye Signs.

Changes in the ocular functions are of very great importance, and frequently complete examination of the eyes gives the clue to the presence and site of a cerebral tumour. Failing vision may be complained of, but it is remarkable to what degree papillœdema may exist without a patient complaining of changes in his sight; and quite frequently complete hemianopia is found, which has been present for some time without the knowledge of the patient. Changes in the disks should be carefully sought; and, when present, they give valuable positive evidence. There may, in the early stages, be only some dilatation of the retinal veins and a slight increase in the small vessels crossing the optic disk, such changes being present for some time before gross papillœdema is observed. Papillœdema occurs very early in tumours of the posterior cranial fossa, due to the interference of the aqueduct and the fourth ventricle, and producing early internal hydrocephalus. In tumours towards the anterior pole of the frontal lobes and in certain tumours of the pituitary, papillœdema may never occur.

Of equal importance are changes in the fields of vision, which may aid in the localization of the lesion, and are classically present with tumours of the optic chiasma, the pituitary gland and tumours of the temporal and occipital lobes.

Epileptiform Convulsions.

Another very important symptom is the advent of epileptiform convulsions. These may be identical with the fits of idiopathic epilepsy, and in persons over thirty-five years of age should always be regarded with the greatest suspicion; the cause should be regarded as a cerebral tumour until found otherwise. The site of onset of the convulsion and its mode of spread are of the greatest moment. Attacks of transitory unconsciousness sometimes occur in which the patient may stagger or fall over without any convulsion. The patient usually states that the fits are becoming more frequent, and in certain cases a *status epilepticus* may occur, lasting for hours. These fits are frequently most amenable to sedatives, and the exhibition of "Luminal" or bromide may make them disappear for many months, and thus lull into a state of false security the medical attendant's fears of an intracranial tumour. These patients should be kept under observation and frequently examined for any other sign of neurological abnormality.

Fits are most likely to occur in tumours of the cerebral hemispheres, especially meningiomata. Minor attacks, associated with certain peculiar aura of sight or smell or hearing, must be always thoroughly investigated. Hughlings Jackson has pointed out the association of certain "dreamy states" and peculiar hallucinations of smell and taste with lesions in the region of the uncus, at the tip of the temporal lobe. Hallucinations of sight may be of two varieties. In one actual figures, bizarre or otherwise, may be seen, always in the same area in the visual fields and associated with lesions in the posterior part of the temporal lobe. The other type of visual hallucination is that of indescribable flashes of light which occur in tumours of the occipital lobe.

Auditory phenomena, again, are of importance. Buzzing or hissing may be complained of, and occur in tumours of the eighth nerve and sometimes in lesions of the temporal lobe. Bilateral temporal lesions always cause deafness.

Many patients complain of vague initial symptoms which are difficult to evaluate, such as slight changes in memory, more easy appearance of mental fatigue, slight changes in behaviour, early unilateral deafness, slight staggering, or certain transitory paræsthesias of one or other limb *et cetera*.

Examination of the Nervous System.

Having obtained as complete a history as possible, our next duty is to examine carefully the patient's nervous system. No amount of accessory diagnostic aids can make up for an inadequate history and a neurological examination lacking in thoroughness. The examination of the cranial nerves is of paramount importance. Most cerebral tumours will cause some change in one or other of these nerves.

Beginning with the olfactory nerve, we may have paræsthesia, that is, peculiar subjective sensation of smell or a unilateral anosmia. These changes are frequently associated with a meningioma of the olfactory grove.

The optic nerves are of course the most important of all. Here one might again state the great importance of the examination of the fields of vision. Early changes are not capable of being identified by the rough finger test, though it may give much information in more advanced lesions. The method of charting the fields of vision on a black screen gives invaluable information, and shows the very earliest changes in the size of the blind spot and of any abnormality of the visual fields. Changes in the visual fields occur not only with lesions of the optic chiasma, such as pituitary tumours, but almost any lesion situated in a temporal lobe will give evidence of its position by interference with the projection of the optic tract back from the lateral geniculate body to the visual cortex. It has been shown that these afferent visual fibres on their way back to the region of the calcarine fissure embrace the anterior horn of the lateral ventricle, and have a point-to-point projection on to the visual cortex. The stimuli from the lower half of the fields of vision pass to the grey matter above the calcarine fissure, and those from the upper half to below the calcarine fissure, with macular vision being projected to the tip of the occipital pole. Keeping this in mind, it is difficult to see how any temporal lesion, except perhaps one in the extreme temporal pole, can escape some interference with the optic tract.

The third and fourth nerves also give some information, but bilateral paresis of both sixth nerves is of no localizing value. When one is affected some time before the other, the site of a lesion may be discovered, as in certain cerebello-pontine tumours.

The long unprotected course of the sixth nerves renders them peculiarly susceptible to damage by any increased intracranial tension.

The sensory distribution of the fifth nerve may be interfered with by tumours about the middle fossa of the skull pressing on the Gasserian ganglion, producing pain and later anæsthesia. The elongated descending root of the fifth nerve nucleus passing down in the medulla is susceptible to pressure by tumours of the posterior cranial fossa. Changes in sensation to touch and pain and diminution of the corneal reflex may be demonstrated.

The seventh nerve again is frequently affected, especially in tumours of the cerebello-pontine angle, that is, the neurinoma of the eighth nerve. Facial weakness is always present in these cases. At times it is difficult to be sure of an early facial paresis, but it will usually be noticed that there is a little lagging of the upper eyelid on the affected side, with normal involuntary blinking.

The eighth nerve is peculiar as being the site of a special type of growth, the neurinoma, which arises in the vestibular division of the nerve at the level of the internal auditory meatus. Although Bailey states that all early neurinomata have been found in the vestibular division of the nerve, the great majority of patients in the early stages complain of cochlear symptoms, that is some irritation of the auditory fibres causing tinnitus and later deafness. In some few cases vertigo has preceded the tinnitus.

The ninth, tenth, eleventh and twelfth nerves have their roots projecting from the *medulla oblongata*, so that they also are susceptible to tumours of the pons, the medulla, cerebello-pontine angle or cerebellum. It is not uncommon to get conflicting evidence of injury to the cranial nerves; that is, there may be evidence of interference of the fifth or sixth and seventh nerves on different sides.

The evidence of damage to the pyramidal tract and sensory paths may be conflicting; that is, it is not uncommon to have homolateral spasticity of the muscles of arm and leg as well as corresponding changes in general sensation.

These changes are due to distortion of the brain tissue by the tumour, which may cause marked indentation of the *crura cerebri* by being forced against the hard edge of the *tentorium cerebelli*.

Clinical Syndromes.

Here reference may be briefly made to some of the clinical syndromes.

Pituitary Tumours.

Pituitary tumours may be made manifest by the changes in glandular activity of the pituitary. Adenomata of this gland are of two types, chromophile and chromophobe.

Acromegaly is associated always with the chromophile type. Apart from skeletal changes, other symptoms are produced by pressure of the growth on neighbouring structures, as the optic chiasma, causing a bitemporal hemianopia, pain behind the eyes and in the temples, polyuria, sweating *et cetera*, from pressure on the hypothalamus; and pressure backwards may give rise to uncinate fits with gustatory or olfactory aura, and also the peduncles may be interfered with. Cranio-pharyngiomata, or suprasellar cysts, or Rathke's pouch tumours usually occur in children and may have a long history, but usually begin under the age of fifteen. There may be headache, vomiting and choked disks, and there may be constant bed-wetting due to the polyuria. In young adults there are signs of diminished sexual development, increase of subcutaneous fat and bizarre changes in the visual fields.

Tumours of the Frontal Lobe.

A tumour of the frontal lobe is usually an infiltrating glioma or a *glioblastoma multiforme*,

but occasionally a meningioma. Tumours of the frontal lobe occur mostly in adults, and may progress to a large size without causing focal or general signs. They are associated with changes in temperament, irritability, failing intelligence, and changes in the patient's habits. Headache is common; the fixed grasping reflex may be present as well as a slight lower facial paresis with diminution or loss of the abdominal reflexes and an extensor plantar reflex on the opposite side. When the lesion is on the left side the mental changes are always more severe, and may be accompanied by various degrees of aphasia.

Tumours of the Temporal Lobe.

Tumours of the temporal lobe are almost always ushered in by changes in the visual fields. A homonymous upper quadrantic defect in the visual fields, which tends to progress to complete hemianopia, is the most frequent symptom; but frequently the patient is not aware of these defects, and his usual complaint is that of epileptic fits, which are frequently of the uncinate type.

Visual hallucinations may occur with the uncinate attack, and in some cases auditory hallucinations of buzzing or whistling or of bells ringing. When the tumour is on the left side there may be definite aphasia. In the later stages papillœdema occurs with hemiparesis and sensory changes on the opposite side.

Tumours of the Parietal Lobe.

Tumours situated in the parietal lobes are characterized by marked changes in sensation and asteriognosis. There is interference with the projection of higher sensory stimuli from the thalamus to the sensory cortex. When the tumour is near the marginal gyrus on the left side, there is definite aphasia with auditory agnosia and alexia. Such tumours are frequently ushered in by the appearance of epileptiform convulsions, which frequently have a sensory aura, referable to a limb or to the side of the face.

Tumours of the Occipital Lobe.

In the occipital lobe tumours will interfere with the visual projection and cause a hemianopia. When they are situated near the *tentorium cerebelli* we have added cerebellar signs.

Cerebellar Tumours.

Cerebellar tumours are most frequently in the vermis, and occur commonly in children, giving rise to a well recognized syndrome. The child becomes unsteady in his gait and tends to fall over; there are vomiting and headache, and early visual changes occur. The history in the case of astrocytomata may be a very long one, the patient having suffered for many years from headache and vomiting, frequently at night or early morning. In these cases there may be long periods of complete remission, until finally the increase of intracranial tension becomes very pronounced, the headaches become more consistent, there is severe vertigo, and attacks of sudden weakness occur in which the patient may fall over. Papillœdema is present, and there are rigidity of the neck, hypotonia, nystagmus, tremor and clumsiness of the limbs on one or both sides. In very young children the tumour is frequently a medulla-blastoma of the vermis, which is one of the most malignant of all brain tumours, and which spreads through the subarachnoid spaces, up into the brain and down the cord to the *cauda equina*.

Accessory Diagnostic Measures.

A skiagram of the skull should always be taken. Very little may be seen, but usually there are some confirmatory changes. The *sella turcica* may be enlarged, the clinoid processes may be thinned out or eroded. There may be widening of the sutures of the skull, and in many cases, when there has been prolonged increased intracranial pressure, as in a tumour of the *vermis cerebelli*, there is a peculiar honeycomb appearance of the diploic sinuses.

In certain meningiomata the skull may be found to be eroded. Pharyngiomata and oligodendrogliomata tend to be subject to calcification, which gives a very definite shadow on the films.

X ray examination after ventricular puncture and the injection of air, or air injected after removal of fluid by lumbar puncture, may give great assistance in depicting the position of the lateral ventricles. The position of the usually calcified pineal gland is of importance.

The cerebro-spinal fluid pressure should be taken in every case. This gives very early evidence of intracranial mischief, and I have noticed that a very high degree of increased pressure may be present for some considerable time before actual changes can be demonstrated by the ophthalmoscope.

A Wassermann test of both blood and cerebro-spinal fluid is advisable; but the return of a positive result, if the patient's condition does not rapidly improve with antispecific treatment, should not delay operative treatment.

Conclusion.

I have attempted to deal with the subject in a general way. First, wishing to emphasize the prevalence of cerebral newgrowths, and, secondly, giving some idea of methods of examination. Dr. Sutton will be able to put before you what present-day surgical methods offer for the relief of patients stricken with this dire malady.

THE TREATMENT OF INTRACRANIAL TUMOURS.[1]

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I THINK that it is indeed fitting that we should be devoting some attention to the treatment of intracranial tumours at this meeting, as it is almost

[1] Read at a meeting of the Queensland Branch of the British Medical Association on November 2, 1934.

exactly fifty years since such a tumour was first accurately diagnosed and localized and subsequently removed at operation. I refer to the famous case in which Hughes Bennett diagnosed a tumour of the motor cortex and Rickman Godlee on November 25, 1884, at the Hospital for Epilepsy and Paralysis, Regent's Park, accomplished its removal from the exact site predicted. The patient lived only four weeks, but the report of the case to the Royal Medical and Chirurgical Society created world-wide interest and comment, and was soon followed by other similar exploits. Victor Horsley was present at that meeting and joined in the discussion which followed the presentation of the case history, and from this time may be dated his interest in intracranial surgery of which he was to be so illustrious a pioneer.

I cannot pretend that I am a competent authority to offer you a full survey of the treatment of intracranial tumours, nor, were I such, would it be possible in the time at my disposal to do more than summarize the main features of the subject. But I feel that, since I have devoted considerable time in the past few years to the study and practice of this branch of surgery, I can attempt to give you some idea of the recent advances made, and particularly to orientate those who have not had occasion to devote much thought to this matter. In saying this I imply that great progress has been made, and it is quite evident from articles constantly appearing in medical literature the world over, even also in the lay Press, that there is an intense effort being made to do something for the unfortunate being who harbours within his cranial cavity some tumour growth.

Many brilliant workers have contributed to the advances of these fifty years, but I think we all realize the predominant parts played by the English school of neurologists of the Queen Square Hospital and by the surgeons associated with them, notably Sir Victor Horsley and Sir Percy Sargent, and by the American School of Harvey Cushing and his co-workers and pupils.

The problem of offering treatment to a patient with an intracranial tumour is a difficult one, requiring careful consideration and collaboration, and the position that modern surgery has attained, makes it advisable that a surgeon experienced in such work be a party to the deliberations. The rôle of the surgeon in this respect is no sinecure and I wish briefly to consider the qualifications which reasonably may be expected of him and the responsibilities he may be called on to shoulder.

In the first place it is most to be desired that he have a sound knowledge of neurology so that he may confirm the clinical indications as to the presence and probable location of the tumour, that is, to answer the first two questions which arise in such suspect tumour cases. As this aspect of the subject has been so ably put before you by my colleague, Dr. Ellis Murphy, I will have no more to say about it.

However, various accessory methods of examination are required, especially of the special senses of smell, vision and hearing, and although for such as the last two the opinion of a specialist is usually sought, yet the great importance of defects of the fields of vision has led me to construct and to use a large Bjerrum's screen with a mechanical recording device as conceived by Dr. E. O. Marks of this city, with which fine variations can be accurately recorded; this has proved a very useful and interesting adjunct in several of our cases. Then again there is the radiological examination which should never be omitted, as on occasion very valuable and complete information is obtained. This aspect of the diagnosis has recently been fully reviewed and I cannot go into it now, except to state that special methods must be used both as regards the technique of taking the pictures and the different methods of using air insufflation. Particularly difficult, however, is the interpretation of the films obtained, and I think that the opinion of a surgeon who is interested and experienced in such work can be of much value. I would here direct the attention of radiographers to the immense importance of suitable posturing and accurate centring in this type of work; and a paper by Twining to the Section of Radiology of the Royal Society of Medicine a year ago is full of useful information.

It is the province of the surgeon to carry out the necessary procedures for the taking of ventriculograms, in which the air is put directly into the lateral ventricles; but often much knowledge can be obtained by the mere tapping of both ventricles, estimating the amount of fluid in each, and ascertaining whether there is a free communication between the two sides.

As long ago as 1908 Cushing wrote that in the diagnosis of cerebral tumours there are three things to be considered: (i) The existence of a growth, (ii) its situation, (iii) its variety; and he pointed out that tumours of certain types have seats of predilection. But his knowledge was then very incomplete, and it is only as a result of the intensive study of large series of tumours that the third question in the diagnostic triad can now be discussed with confidence and in some cases answered with exactitude.

This is such an important fact in the surgery of intracranial tumours that I wish to stress to you that the days when the diagnosis of tumour of a certain region of the brain was considered quite sufficient, are now past and no adequate discussion of treatment is possible without some amplification of this conception. Of course, I can only consider this phase of the subject quite briefly tonight, but it is the major theme of Professor Bailey's recent work on intracranial tumours, a book of outstanding merit which must be consulted by anyone interested in this subject.

In the first place various distinctive syndromes have been described associated with typical tumours which occur with sufficient frequency as to render them more or less easily recognized, such as, for example, the cerebellar astrocytomata of children,

the acoustic nerve tumours and the parasagittal meningiomata. Secondly, there has emerged a more definite and orderly classification of tumours with varying degrees of malignancy and corresponding variations in their susceptibility to surgical attack. This has resulted from a correlation of careful neurological examination checked by operation findings and the histological examination of material removed then or at autopsy.

Types of Tumour.

Illustrations of this class of knowledge are the differential diagnosis of tumours in the region of the pituitary fossa, the hypophyseal adenomata, the cranio-pharyngiomata and the meningiomata arising from the *tuberculum sellæ*, which has been critically discussed. In most cases a correct conclusion can be arrived at, and this of course is rather important from the point of view of treatment and prognosis. But one of the outstanding developments is the result of an intensive study of the motley group of tumours classed under the general name of gliomata.

The histology of the central nervous system has been elucidated by the use of special gold and silver impregnation staining methods, which were perfected in Spain by the Master Ramōn-Cajal and his pupils, the most distinguished of whom, del Rio-Hortega, has done much work on the cell types of the supporting tissue of the brain. This work led Cushing and Bailey in America to draw up a comprehensive classification of the connective tissue tumours of the brain, that is of the gliomata. This has given us a much clearer conception of that large group of tumours which form over 40% of all intracranial growths, and which vary so widely in their rate of growth, infiltrative tendencies and degree of malignancy. It is quite out of place here to attempt to recapitulate such a classification in full, but I think I may be pardoned if I illustrate my point by mentioning the most commonly occurring varieties and their clinical characteristics. Their histology of course I shall omit.

The astrocytomata are the largest group, representing 37% of all gliomata, which makes them about 15% of intracranial tumours as a whole; and fortunately they are in general relatively benign lesions, growing very slowly, and eminently suitable for surgical treatment. When they are completely removed, the prognosis is good, and even when they are incompletely dealt with, the survival period of the patients is very long, averaging five to six years, and this makes their treatment well worth while. They are probably not sensitive to radiation therapy, any claims for success with such treatment being accounted for by their natural indolence.

They should be considered in two groups, the cerebral astrocytomata which are more common and occur in adults, and the cerebellar tumours which are typically tumours of childhood; the cerebral type are about twice as common as the cerebellar. In either situation they may be solid, partly cystic or almost wholly cystic with a small nubbin of solid tumour in the wall of the cyst. The cerebellar cystic astrocytomata usually occur in the mid-line and give rise to a typical syndrome which has been graphically described by Cushing.

The multiform spongioblastomata or glioblastomata are the next most common, and form 30% or more of the glioma group, and unfortunately they are a highly malignant and rapidly growing type. They are always found in the cerebral hemispheres of adults arising in the white matter, but, infiltrating widely and growing rapidly, they give rise to large tumour masses with only a short clinical history of a few months or even weeks. Hæmorrhages and degenerative processes are common, so that clinical signs are apt to arise and to change abruptly, which often makes diagnosis difficult and the differentiation from vascular lesions or encephalitis uncertain. Surgical attack has been made more feasible by the introduction of the high frequency endotherm loop, but even after an apparently successful radical extirpation, recurrence rapidly occurs and a survival period of six months is all that can be expected. Radiotherapy has not given anything more than temporary amelioration.

The same depressing outlook occurs in the next most frequent class of gliomata, the medulloblastomata, which form about 12·5% of the group. These tumours occur typically in the mid-cerebellar region of children and young adults, and are amongst the most malignant of all cerebral tumours, showing remarkable tendency to spread over the surface of the brain in the leptomeninges. The clinical picture resembles that of the cerebellar astrocytomata, but with a more rapid evolution. However, it is usually impossible to be sure of the differential diagnosis prior to operation. On this account, although the medulloblastomata can never be totally removed, and in fact interference with the tumours is very apt to promote widespread dissemination, it is usually wise to explore by the suboccipital approach, which involves the making of a large bone defect, and then if a medulloblastoma is exposed, to close the wound and to subject the patient to a thorough course of radiotherapy over the entire cerebro-spinal system. As these tumours are the most susceptible of all the gliomata and extension of the growth may be held in check for periods up to a year or more, recurrence and a fatal issue are always the end result. Cushing also describes a cerebral type of medulloblastoma occurring at any age and of a much less degree of malignancy, but the classification of such types as these presents considerable difficulty.

These three most frequently occurring varieties account for 80% of all gliomata, and nearly half of them are of relatively benign nature, and eminently susceptible of amelioration by treatment. The remaining gliomata are of varying types which occur relatively infrequently, but many of them approach the astrocytomata in their slow

evolution and survival period after operation. The gliomata make up 42% of all intracranial tumours, and as a further 40% are of three well defined types, all of which can be treated surgically or otherwise with some hope of success, I think I must briefly refer to these.

First, adenomata of the pituitary gland form almost 18% of the total, according to Cushing's figures. This may be thought to be a high figure, but he considers that they are just as common as thyreoid adenomata, and their percentage of incidence is likely to be higher in future tabulations. They are of two principal types: the more common chromophobe adenomata, which give rise to the hypopituitary syndrome, and the chromophile tumours associated with gigantism if occurring before puberty and with acromegaly if, as is usual, they develop later. It is, however, on account of their pressure on the optic chiasma and the consequent loss of vision that they come under notice and merit treatment.

The differential diagnosis of these adenomata from the cranio-pharyngiomata or suprasellar cysts and meningiomata in this region has already been referred to.

Meningiomata are tumours arising from the arachnoid granulations in relation to the large venous sinuses, and so they are usually found in well defined areas. They account for 13% of the total growths. They have a definite capsule and do not invade the brain, but merely compress it; but they are usually firmly attached to the dura and are apt to cause both erosion and proliferation of the overlying bone.

On account of these characteristics they may be considered eminently suitable for surgical removal. However, because of the size they attain, their extreme vascularity, and the fact that they usually grow in the neighbourhood of and often actually involve large venous sinuses, their removal involves an operation which is often extremely formidable, and which requires all the resources of modern cerebral surgical technique to bring about a successful issue.

The last group to which I shall refer are the tumours of the acoustic nerve, which occur with a frequency of about 9%. These well known tumours grow in the nerve itself, usually originating close to or actually within the internal acoustic meatus, and they give rise to a typical syndrome with primary interference with the cochlear and vestibular functions of the nerve, and later pressure effects on the cerebellum itself and the neighbouring nerves of the cerebello-pontine angle. They are essentially benign and slow growing, and, although their complete removal is hazardous and not often attempted, intracapsular removal, which must of necessity be incomplete, gives results which relieve the patient for a considerable number of years.

I have now accounted for over 80% of all intracranial tumours as follows: gliomata, 42%; pituitary adenomata, 18%; meningiomata, 13%; and acoustic nerve tumours, 9%; and I think it unnecessary to discuss the various types which make up the remainder as they are fairly numerous, but occur only infrequently.

There are two lesions which, however, I must mention. They are metastatic growths, forming 3%, and the granulomata of tuberculosis and syphilis, which make up 2% of the total. It is obvious that careful exclusion of a primary malignant tumour of some other part of the body is necessary, as in such cases operation for intracranial metastases is not advisable and can offer very little to the patient. The most common sites of the primary growths are the breast, the lungs, the kidneys and the melanotic tumours of the skin.

The granulomata of tuberculosis and syphilis are relatively rare, apparently much rarer than used to be allowed, and although they cannot always be correctly diagnosed, there will often be constitutional stigmata to suggest them. A failure on the part of the blood and cerebro-spinal fluid to react to the Wassermann test is sufficient to rule out the rarely occurring gummata of the brain. Actually these are notoriously resistant to antisyphilitic treatment, and surgical measures are usually indicated; long courses of diagnostic antisyphilitic treatment are hardly justifiable in such circumstances.

Methods of Treatment.

But it is time I turned to the actual means at our disposal for dealing with these lesions. They are surgery (radical or palliative), radiotherapy, or the impotent administration of morphine.

It must be recognized that any tumour growing inside the cranium must inevitably terminate life, and the course of such a process, be it rapid or slow, is usually far from pleasant either for the unfortunate sufferer or for the harassed onlookers. The great majority of slow growing tumours cause impairment of vision and blindness before the end, and reduce their bearers to such a state of incontinent helplessness than which anything offering a gleam of hope is infinitely preferable.

From such considerations, fully realizing the responsibilities incurred in undertaking surgical operations carrying high mortality rates, I have satisfied myself that their performance is a duty which cannot be disregarded. But in attempting to perform such a duty it is obviously necessary to take every possible means to do one's best for each individual patient. This involves the acquisition of the necessary technique for the safest performance of the operation, and the closest study of pathological types so that the correct procedure may be employed for each lesion found.

Bailey has truly written: "Anybody can open a head, for better or for worse, but only a neurologist can interpret what he finds, except in the most obvious circumstances." I can assure you that this has been forcibly obtruded on me, and has made me realize my own shortcomings; it has also spurred me on to make every effort to improve my own imperfect knowledge.

In advocating surgery in the treatment of these tumours I could, of course, glibly state that Cushing's general mortality rate in 412 cases operated on between 1928 and 1931 was only just over 13%, but such a statement would carry little weight, because they are the figures of the world's expert, and have been attained only after about thirty years of continued effort and experience. No mortality rate approaching this could be shown in any series in Australia, as serious attention to this branch of surgery is of only recent origin, and such a high standard of efficiency and safety has not yet had time to be developed.

Perhaps from this it might be argued that we should send all our patients to an American clinic, or in these days of rapid air travel to one of the newly developed British clinics, where men who have studied with Cushing are doing such good work; but this solution is out of the question, and surely we must develop our own abilities and continually strive to improve.

The general technique of craniotomy for intracranial tumour has long been a well established procedure, and if one reads Cushing's full description of it in "Keen's Surgery" of 1908, he will be surprised to see how well it was then understood, and what few modifications there have been in methods in these twenty-five years.

The elaborate systems of cranio-cerebral topography of my student days are for practical purposes obsolete. They were obsolete when I learned them, but my teachers did not include among their number a neurosurgeon, and I saw no attempt to deal with a tumour radically.

Surgical Operation for Cranial Tumour.

Tumours are now exposed through large osteoplastic flaps turned down in the appropriate region —frontal, fronto-parietal or occipital. An attempt is always made to hinge such a flap on the temporal muscle, so that the frontal flap is turned backwards and downwards, the fronto-parietal straight down over the ear, and the occipital forwards and downwards. This for several reasons. The temporal muscle forms an excellent hinge and carries a good blood supply to the bone of the flap, the squamous temporal bone is thin and easily broken across to turn down the flap, and finally the operation is often concluded by leaving a good sized bone defect in the squamous temporal as a decompression, where the muscle and strong temporal fascia amply protect the patient against *hernia cerebri*.

In the occipital region, to approach the posterior cranial fossa the classical procedure is different, and the method of Cushing is very generally employed. It consists of the cross-bow incision, the turning down laterally of the two thick vascular musculo-aponeurotic flaps, and then making a large bilateral bone defect which is, of course, left permanently, and which acts as a decompression protected by the thick muscles of the back of the neck.

The important technical points to be considered are the anæsthesia, the control of hæmorrhage, the making of the bone section, and the intracranial manipulations, and these will be now briefly reviewed.

The best method of anæsthetizing patients for these operations has by no means been agreed on, and there are various indications to be met. These operations, as practised by the most successful surgeons, are long, lasting two, three, even five hours or more, and all the intracranial work is best performed with care and deliberation, and is painless. Thus the first part of the operation, the opening of the cranium, and the stitching up have to be considered, and these can usually be painlessly done under local anæsthesia, provided the operator is skilled in its production; but one must admit that a long operation under such conditions is distinctly a trying experience for any patient, and it is usually desirable to employ some additional sedative. It is thus that I have done all my own operations, and it is the method now employed by Cushing, who has been converted from ether by the French neurosurgeon, Thierry de Martel.

The additional sedation required is, to my mind, the crux of this method, and I am not yet finally decided on the matter. Let it suffice for me to say that I had initially most gratifying and successful results with "Sodium Amytal", only to find, of course, that, like that of all barbiturates, the effect is uncertain. I have used morphine also quite well, but I am, as I have said, not yet fully decided on the matter, and it is indeed a subject that could be debated all night.

Other surgeons advocate endotracheally administered ether or nitrous oxide and oxygen gas, but these too have the disadvantage of increasing the vascularity of all the structures being dealt with, which can to some extent be counteracted by posturing the patient with the head raised, a position usually adopted for this purpose in any case. Chloroform was originally used in England, but in spite of the "die-hards" has rightly been given up.

Next comes the question of hæmostasis, and this has to be considered at the various levels of the operative progress—the scalp, the bone, the meninges and the brain.

To control the profuse hæmorrhage which occurs when incisions are made in the scalp, a tourniquet was formerly applied round the head just above the ears, but this had many disadvantages. It was not very efficient, and in making the osteoplastic flaps it was in the way, particularly in the frontal and temporal regions. Special clamps were also devised to clip on the whole length of the incised scalp; it is impossible to grasp the individual vessels with ordinary artery forceps, and this method is still in use. But the classical method now almost universally adopted is to make the incision in short sections of a few centimetres, whilst digital pressure is made on either side of the cut by an assistant; the *galea aponeurotica* is then seized with artery forceps at intervals on either side, and this struc-

ture is turned up over the open vessels and controls their bleeding throughout the operation. By this method the scalp incisions can be quickly made with a minimal loss of blood in any region of the head; the forceps are subsequently tied together by tape in appropriate groups.

Bleeding may be profuse from the torn mouths of emissary veins, particularly when there is raised intracranial pressure, and this may cause some difficulty. The foramina are firmly plugged with Horsley's bone wax; sterilized chewing gum is a good substitute; or sometimes they may be pegged with short lengths of wooden match or plugged with a small piece of muscle which can usually be readily secured. Then, again, when the bone is cut there may be a steady flow of blood from the diploic veins, which have to be dealt with in a similar manner, usually the liberal use of bone wax. Bleeding from the meninges may be an oozing from the finer vessels or a brisk hæmorrhage from one of the main meningeal arteries. Before incising the dura, the vessels in the line of the proposed incision should be occluded either by pairs of Cushing's silver wire clips or by fine silk ligatures passed round them with a small round needle.

The use of Cushing's clips involves the possession of a special set of instruments, first to cut and shape them from the flattened silver wire, then to carry them so that they are easily grasped by the forceps with which they are applied. Slight oozing can usually be controlled by the application of cotton wool moistened in saline solution and left *in situ* for some time, or again by muscle tissue. Bleeding from the larger sinuses may be profuse and difficult to cope with, but the same methods are used, and it can always be controlled temporarily by pressure of wet cotton wool.

The exposed brain must always be treated with great respect, and it is best covered by slabs of wet cotton wool whenever it is not actually the seat of operations. Bleeding here is controlled by pressure of wet wool, which can be made to adhere by being sucked into position with the glass nozzle of a sucker, by muscle tissue, clips, irrigation with hot saline solution, or by coagulation with the high frequency current.

The last method, whilst very efficient, must be used with considerable discretion, as its action is diffused rather too much and it delays healing and favours infection.

Regarding the methods of cutting the bone flaps I intend to say little. The general plan is to make appropriately placed openings with a brace and burr, which is much preferable to the old fashioned trephine, and then to connect up these with a cut made by some type of saw. Doing this with hand power is certainly something of an effort, but if one knows the correct methods of using the tools, it is surprising how smoothly and rapidly it can be accomplished. There are all types of motor driven instruments in use to lessen the labour involved, but in general they do this at the expense of safety, and I think the perfect method has not yet been evolved.

It is when the bone flap is turned down and the tense dura is opened that the real art of intracranial surgery has to be displayed. The tumour may be evident; very often it is not, and has to be found beneath the cortex; and when it is found, an attempt has to be made to extirpate it. This involves gentle retraction with malleable spatulas protected by cotton wool, separation with pledgets of wet wool, incisions or scooping out with the endotherm electrodes—all highly technical manœuvres which would take too long to describe fully, and which require much practice and experience to accomplish successfully.

It is when faced by an infiltrative lesion that one has to make a decision as to whether to attempt a widespread resection or to be satisfied with a decompressive operation and a subsequent course of radiotherapy. Although many such tumours have been successfully extirpated, widespread removal of cerebral tissue which would inevitably leave a patient seriously impaired mentally or hopelessly crippled, is not a procedure that commends itself to most surgeons.

In the course of the operation it is often necessary to lower the intracranial tension, and this may be done by the intravenous or rectal administration of hypertonic saline solutions, which are effective in ten to fifteen minutes, or by the tapping of the lateral ventricle with a brain needle through the exposed brain or through an appropriate burr hole.

Hæmorrhage, shock and respiratory failure are the immediate complications most to be feared, and they must be met by change of posture, by infusion of saline or gum solution, or by blood transfusion.

The post-operative period is critical, and the patients must be watched for signs of increased intracranial tension, indicative of œdema or reactionary hæmorrhage and evidenced by a bulging flap, slowing pulse and advancing coma. In the face of such signs, if no relief is got from lumbar puncture and hypertonic infusion, the flap must be reopened and the blood clot irrigated out.

Another dreaded complication is post-operative hyperthermia, which is especially apt to follow interference with the hypothalamic area, and which is usually fatal.

Most neurosurgeons are now agreed that the best approach to the pituitary area is from above through some type of frontal flap with upward retraction of a frontal lobe, preferably the right, by which route the chiasma can easly be displayed, and the portion of the tumour actually pressing on it and causing the outstanding symptom dealt with.

It is in the pituitary adenomata that radiotherapy has had some brilliant results, and although perhaps this is not the view held in the best schools of neurosurgery, I think it always worthy of a trial, the result and progress being carefully watched by repeated examination of the fields of vision on a large screen; of course, in the presence of a cystic tumour, which is a common type, radiotherapy will probably fail.

The particular features of the suboccipital approach to the subtentorial region I have already indicated. The operation requires the patient in a prone position with the shoulders supported and the head well flexed. I have designed and had constructed a special frame to maintain this posture with ease; it can be placed on any operating table and is portable. A large bone defect is nibbled away with rongeurs from the back of the mastoid process behind the lateral sinus on one side to the other, the posterior segment of the rim of the *foramen magnum* is removed and often the arch of the atlas. This is an undertaking of some magnitude, but the exposure gained is good and the safety of the operation is much increased by having so large an opening in the bone. The time consumed in making such an exposure and in closing the wound securely in layers is something over two hours, so that it is readily seen that, with the addition of the intracranial manipulations which have to be most careful and gentle on account of the close proximity of the vital centres of the medulla, the operation is an extremely long and tedious one.

Professor Bailey concludes his book with the statement:

> In spite of the progress of the last fifty years, the surgical treatment of intracranial tumours is still a precarious, back-breaking, and heartrending business to be undertaken only by those who have especially prepared themselves for it.

I can truly say that I entirely agree with him.

Conclusions.

Perhaps I should ask your pardon for the manner of presentation of this paper; and I am doubtful of its real value, since I have attempted to compress into a short session an immense amount of knowledge which has been gradually accumulated, and which is now more profitably discussed in detail, each tumour type and each cerebral region demanding individual consideration. I have felt, however, that we have lagged behind in this field of endeavour, and such a summary as this may be of use here in placing the present position of this branch of surgery in its true perspective.

Reports of Cases.

SPINA BIFIDA WITH MYELO-MENINGOCŒLE.

By BERTRAND A. COOK, M.B., Ch.M. (Sydney),
Boorowa, New South Wales.

BABY P., a male, was born on July 31, 1933, after a protracted labour assisted by forceps. After the birth of the head considerable difficulty was experienced in delivering the buttocks, which appeared to be obstructed by a tumour-like mass. On delivery, the lower lumbar region was found to be occupied by a large cystic swelling the size of a big navel orange, ulcerated posteriorly, and leaking a light straw-coloured fluid. The baby weighed 3·8 kilograms (eight and a half pounds) and had double *talipes calcaneo-valgus*.

The ulcerated part of the tumour, provisionally diagnosed as myelo-meningocœle with *spina bifida*, was oversewn with catgut and a compound tincture of benzoin dressing was applied with the object of sealing the leak and to prevent contamination with fæces and also to prevent possible meningitis. Five days after birth, as leaking continued and a sudden rupture was feared, operation was undertaken to aim at a radical cure. With the buttocks considerably raised above the level of the head, chloroform anæsthesia was induced, and an incision was made on the left lateral aspect of the swelling. The cavity was explored and diagnosis was confirmed. A number of nerve trunks were encountered traversing the space, and the fluid was evacuated. The nerves were resected and a probe was passed through the opening in the *spina bifida* into the spinal canal. This opening was closed by a plastic operation, the dura being used for a flap and the surplus being excised. The redundant skin was cut away and the wound was closed with horsehair sutures. The child manifested no shock, and was immediately returned to its mother at the obstetric hospital for breast feeding. Convalescence was uninterrupted.

In a week the child used its legs for the first time, and movement was encouraged. Seen on November 1, 1934, fifteen months after operation, the child was found to weigh 12·37 kilograms (twenty-seven and a half pounds). It can stand on both feet and walk by pushing a chair in front of it. There is no return of the swelling. All reflexes are present, and if it were not for the talipes condition noted above, it would have normal use of its legs. The mother has again been confined for a normal male child, and when she is well enough an effort will be made to correct the talipes deformity.

A FOREIGN BODY IN THE ŒSOPHAGUS ASSOCIATED WITH MASSIVE COLLAPSE OF THE LUNG.

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AND

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Clinical History.

R.H., aged thirty-five years, a labourer, was admitted to the Royal Prince Alfred Hospital on the afternoon of May 24, 1934, complaining of dysphagia, pain in the throat, cough and dyspnœa. He stated that three days previously, while eating stew at tea, he had felt a tearing pain in his throat. Though vomiting was induced, nothing came up beyond soft food. The vomiting was accompanied by some coughing. He had worked for two days subsequent to the accident, being able to take slop foods without vomiting, but always with dysphagia. On the second day he noted for the first time about mid-day that he was short of breath. This increased and breathing became difficult. During the night he felt feverish and sweated a lot, and he had to sit up with three pillows. The pain in his throat and the shortness of breath increasing on the third morning, led him to seek relief at the hospital.

It appeared that he had had a cough with sputum for some two weeks. He had noted no alteration in cough nor in amount of sputum. Since admission he had coughed up about one drachm of inoffensive muco-purulent sputum. He had not coughed blood at any time.

When seen at 8 p.m., the patient was sitting up in bed, flushed but not cyanotic, somewhat dyspnœic but not in obvious distress. His temperature was 36·8° C. (98·2° F.), his pulse rate was 114, and respirations numbered 24 to the minute.

The physical signs were striking:

1. The apex beat was displaced, being only three centimetres to the left of the sternum.

2. There was practically no movement of the lower half of the right side of the thorax.

3. The percussion note was dull over the whole of the right lower lobe.

4. Vocal fremitus and resonance and breath sounds were absent over the right lower lobe. No accompaniments were heard in either lung.

The history was suggestive of an œsophageal block, now possibly complicated by mediastinitis. But the physical examination strongly pointed to a foreign body being lodged in and blocking the lower right main bronchus, with a resultant collapse of the right lower lobe. It was agreed, however, that the patient's condition demanded endoscopy forthwith. (It was stated that a skiagram of the chest had been taken on admission, but it could not be found at the time. When located two days later it was seen to have been taken in an oblique plane to enable an œsophageal bolus to be visualized. The radiologist reported the lower lobe of the right lung to be opaque.)

Under general anæsthesia an œsophagoscope was passed, and a piece of bone was found lying transversely across the lumen of the œsophagus at approximately the level of the fourth dorsal vertebra. The end of the bone on the right side was seen to be penetrating the œsophageal wall, which was very œdematous for a distance of about six centimetres above and below this point.

When the bone was being withdrawn a small amount of pus was seen to exude from the œsophageal wall where the point had been impaled. A rapid examination of the larger bronchi revealed no abnormality beyond a very small amount of muco-pus.

The patient had an uneventful convalescence. His temperature after a brief rise fell to normal twenty-four hours after the operation, and remained normal. An examination of the chest four days later showed the heart to be in its normal position. There was, however, still a definitely impaired percussion note over the base of the right lung. The breath sounds were weak and occasional râles were heard in this area. At the end of one week no abnormal physical signs were detected, and a skiagram revealed a normal lung.

Discussion.

This appears to have been an example of collapse of the lung of the type described by William Pasteur as "active lobar collapse".

From the history it would seem certain that the collapse of the lung commenced on the day prior to admission, and that on the evening of the operation there was present complete collapse of the right lower lobe.

It remains to discuss the cause of this unusual complication in this case. A considerable literature has grown around the subject of massive collapse of the lung, and it is being recognized as a not infrequent occurrence. We have not, however, found a case in the literature similar to the one described above. In regard to the actual mechanism of massive collapse there are, as is well known, two rival schools. One holds the theory, supported by experimental evidence, that a plug of mucus blocks the bronchus, while the other maintains that the essential factor is a spasm of the bronchial musculature, due to reflex nervous stimulation.

Sante,[1] the American radiologist, states in one of his papers on the subject: "It seems most probable that some infection or insult to the region of vagus supply produces a reflex action of the bronchioles, permitting their temporary collapse." Our case undoubtedly fits in with this theory rather than with the mucus plug hypothesis. The inflammatory area around the right wall of the œsophagus must obviously have given "insult" to the right vagus from its anatomical proximity. From this vagal stimulation there followed the reflex action on the bronchioles of the right lung, which resulted in massive collapse of the right lower lobe.

Summary.

1. A case has been described of foreign body in the œsophagus simulating foreign body in the right lower bronchus.

2. The simulation has been shown to be due to massive collapse (active lobar collapse) of the lower lobe of the right lung.

3. Consideration of the facts makes it almost certain that the cause of the collapse was a reflex nervous mechanism.

Reference.

[1] L. R. Sante: "Massive Collapse of the Lung", *The Journal of the American Medical Association*, Volume LXXXVIII, May 14, 1927, page 1539.

Reviews.

COLLOIDS.

"THE LYOPHILIC COLLOIDS", a monograph by Fischer and Hooker, summarizes the work done by the authors during the last fifteen years.[1] To be appreciated the book should be studied with an open mind; it provides all students of biology with much food for thought. It is difficult to do justice to its fundamental conceptions in a review.

The authors present to us a relatively simple conception of the nature of these hitherto apparently overwhelmingly complex substances, and the complex formulæ, intricate laws and higher mathematical treatment of the multitudinous exceptions to these laws, which the physical chemist, colloid chemist and physiological chemist have evolved, fall by the wayside. The authors marshal evidence culled from a comprehensive field of natural phenomena, ranging from such substances as hydrated phenol and quinoline to soaps, paints, varnishes, pharmaceutical preparations and highly organized protoplasm, to show that these substances which are known to behave in a fashion paradoxical to the laws governing dilute solutions are in reality not solutions of X in water, but of water in X, where X is any substance capable of entering into colloidal combination with water.

The book is divided into three parts.

Part I is concerned with the general nature of the lyophilic colloids. By definition, using the terminology of Freundlich, a lyophilic (solvent-loving) colloid is a colloid which is "viscid, gelatinizing and not easily precipitated by salts". Starting with simple colloids such as those resulting from a mixture of water and phenol, water and quinoline, water and soap *et cetera*, the authors emphasize that there are always two phases, the one X (phenol, quinoline *et cetera*) in water, that is, a true dilute solution; the other water in X, that is, a colloidal solution or solution of inverse type. The vast difference in behaviour of these two types of solution to acids, alkalis, salts, cooling, resistance to the passing of an electric current and other physical properties, is illustrated in great detail; and emphasis is laid on the inability to explain the behaviour of the water in X system by laws of osmosis, Donnan equilibrium and other laws governing the dilute

[1] "The Lyophilic Colloids (Their Theory and Practice)", by M. H. Fischer and M. O. Hooker; 1933. London: Baillière, Tindall and Cox. Royal 8vo., pp. 254, with 84 illustrations. Price: 22s. 6d. net.

solution. The view is advanced that the remarkable difference in the water-holding capacity shown by gels when different acids or alkalis are added (these differences are clearly shown not to be due to the pH or CH or molar concentration) is due to the combination of the acid or alkali with *X* to form a new compound. One very pretty example of a solution of inverse type is the case of sulphuric acid. Concentrated sulphuric acid, as is well known, does not give an acid reaction to indicators, and this, according to the authors, is due to the fact that concentrated sulphuric acid is a solution of water in H_2SO_4; and as evidence to support their contention they discuss the changing electrical resistance on dilution of the acid with water to a stage when the acid becomes a system of H_2SO_4 in water. Colloidal substances of simple proteins such as casein and fibrin are shown to exhibit the same behaviour to salts, acid, alkali, electrical resistance, temperature *et cetera*. Numerous tables and photographs are given to illustrate the text.

Part II is concerned with chemical applications; the authors show that the phenomena discussed in Part I are of importance in understanding the chemistry of "those industrially important groups that appear in the manufacture of soap and various cosmetics, rubber manufacture, the preparation of nitrocellulose derivatives and their manifold employment in the arts, dye-vat chemistry, the whole process of tanning from preparation of the skins to their fixation by tanning compounds or chromium, the manufacture of greases, the manufacture of glues and sizes and the chemical processing of all types of proteins and carbohydrates as seen in the textile industry". In this part there are sections dealing with the greases and the livering of paints.

Part III, consisting of forty-three pages, is devoted to biological applications; the phenomena discussed are of the very nature of things. One reads in it the future of medicine as a biological science, and envisages the compleat physician as a competent biologist. Empiricism will be replaced by the understanding of the effects of this or that chemical substance, now known as a drug, on the cell as a colloid complex. The osmotic concept of the cell and the theory of its semi-permeability are severely criticized. Œdema is dealt with as a problem of colloid chemistry. Changes in the pressure of the circulating fluids with increases in the permeability of the vessel wall are shown to be inadequate explanations of this condition. The authors show that the available osmotic pressure is not sufficient to account for even mild grades of œdema, but that changes in the capacity of the tissue colloid for holding water (due in general to changes in acidity) would account for extreme grades of œdema. "Acids when brought into contact with proteins unite with them to form a new set of protein derivatives, each of which has a specific solubility for water and thus a specific capacity for swelling." One thinks of the firmly rooted conception that change in the reaction of the tissue is incompatible with life and that the pH remains practically constant even in extreme pathological states. The authors show that there is no means at present of even measuring the pH of colloidal solutions, which are really anhydrous solutions. In this part one feels that the authors have somewhat too enthusiastically moved from the sphere of careful experiment to that of theories, and though theories are useful for the advancement of science, they are out of place in this book which sets out to condemn the current theories on this same problem.

The section dealing with the synthesis of living matter is perhaps the most interesting of the book. Many of the paradoxes of enzyme action are explained; Nature always makes her analysis in an aqueous medium (digestion in the alimentary tract), and her synthesis in an anhydrous one (as obtains after passage through the intestinal mucosa).

The book ends with the following sentence: "A better and more fruitful period will be upon us when attention is fixed upon the behaviour of what we must call, for lack of a better name, solutions of inverse type, under which heading there will reappear a large number of those solutions which the chemist has called concentrated. When we have discovered their laws, when we have familiarized ourselves with the physicochemical and colloid-chemical behaviour of systems of the type water-dissolved-in-x we shall find ourselves possessed also of the laws which govern the behaviour of protoplasm under physiological and pathological circumstances." The book is a milestone at a cross-road in the study of biology.

FRACTURES, DISLOCATIONS AND SPRAINS.

J. A. KEY AND H. E. CONWELL have written a book for the student, the general practitioner and the surgeon for the purpose of furnishing a practical working guide in the management of fractures, dislocations and sprains.[1] The book epitomizes the practical experience of the authors, as it is obvious that all procedures recommended have been carefully tested before being incorporated in its pages. The authors confess that they have used the work of other surgeons whenever this seemed desirable, and the reader will realize that this practice has helped to make the work of wider interest. Such recent procedures as the Winnett-Orr method for the treatment of old infected compound fractures, the incorporation of calcium salts in cases of non-union of fractures, the use of the fluoroscope in the immediate treatment of fractures, and the various methods of bone grafting, are fully discussed and their indications are clearly laid down. The general plan of the work renders the task of selecting any particular fracture for study an easy one, and conduces to frequent reference in cases of difficulty.

The authors utter a timely warning against the modern tendency to rely on violent manipulations under the fluoroscope for the reduction of difficult fractures, and in these difficult cases they prefer early open operation to recourse to violence which would be harmful. Their attitude on the internal fixation of fractures is in accord with the consensus of opinion today; they state that the frequency of internal fixation varies inversely with the skill with which the fractured limb is treated. They express a preference for plaster of Paris casts combined with some form of traction apparatus, such as that devised by Hoke for the immobilization of fractures, and they consider that use of Kirschner wire in skeletal traction is finding more and more advocates owing to the fact that the risk of skeletal infection is much less than with the older forms of pins. Various other methods of traction are also fully described. Local anæsthesia in its various forms in the use of fractures receives adequate treatment. The authors prefer an inlay bone graft augmented by bone chips and an osteoperiosteal graft in the treatment of non-union, and they emphasize the value of "trophic stimulus of function" in the after-treatment of these conditions.

A very useful chapter includes some sound advice on medico-legal cases which may arise, and on the *Workers' Compensation Act* as it affects fracture cases. Brain trauma and fractures of the skull provide material for an interesting and comprehensive review of the latest work done in this field, and the various complications in the injuries to the vertebral column have been discussed at length. The vexed question of fractures involving joint surfaces again comes up, and we feel that any practising surgeon who is unable to derive help from a careful scrutiny of these pages must indeed be well satisfied with his own work. The illustrations are excellent and well chosen and adequately supplement the letterpress.

We feel that no book on this subject published in recent years has more successfully satisfied the conditions necessary to appeal to a varied class of readers.

[1] "The Management of Fractures, Dislocations and Sprains", by J. A. Key, B.S., M.D., and H. E. Conwell, M.D., F.A.C.S.; 1934. St. Louis: The C. V. Mosby Company. Australia: W. Ramsay. Super royal 8vo., pp. 1164, with 1165 illustrations. Price: 90s. net.

The Medical Journal of Australia

SATURDAY, FEBRUARY 2, 1935.

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Authors who are not accustomed to preparing drawings or photographic prints for reproduction, are invited to seek the advice of the Editor.

A LEADER IN AMERICAN MEDICINE.

AMERICAN surgery owes more to Franklin H. Martin than to any other living man. The surgery of a country so large and active as America necessarily influences the practice of surgery in other countries; these countries therefore share in this indebtedness. A rare opportunity of acknowledging the debt has arisen in the publication by Martin of an autobiographical sketch entitled: "Fifty Years of Medicine and Surgery." This volume has been sent as a gift under the signatures of Allen B. Kanavel and Franklin H. Martin to the subscribers to *Surgery, Gynecology and Obstetrics* "in appreciation of their interest in scientific medicine, which has made possible the development of a journal designed to advance the frontiers of surgical thought".

The story of Franklin Martin's life as told by himself is a very human tale. He begins at the period of his life when he decided to study medicine, and he writes of his student days. He describes his graduation and tells of his courtship in a charming and natural way. Then came the early days of medical practice, of abdominal surgery undertaken in the Listerian manner, and of papers read before hostile medical audiences. This is all an interesting preamble to the first great event that was to make Martin known all over the world—the establishment in 1905 of *Surgery, Gynecology and Obstetrics*. Up till that time *The Journal of the American Medical Association* was the one journal in America "that was divorced from extraneous financing". Martin undertook the project and enlisted the interest of well known surgeons as sponsors. He accepted financial aid to the extent of 49% of the required amount, and thus kept the controlling interest in his own hands. The sponsors received interest for their subscriptions, and later on the subscriptions were redeemed at par. The journal is now owned by Martin and his wife. After the successful establishment of *Surgery, Gynecology and Obstetrics* (Martin states that no child was ever burdened with a less euphonious name), it became evident that surgeons were growing dissatisfied with the reading of routine academic papers that merely told of things that were happening, and that their technical and mechanical problems impelled them to seek actual demonstrations in operating theatres. This led Martin, through the medium of his journal, to inaugurate the first Clinical Congress of the Surgeons of North America. These congresses were successful from the beginning, so successful, in fact, that they threatened to become unwieldy. As a result, Martin conceived the idea of forming an American College of Surgeons. The late John B. Murphy was heart and soul with Martin in this enterprise. Preliminary meetings were held, but the support was by no means wholehearted; indifference and active opposition had to be overcome. Eventually determination won. It is interesting to read the account of this foundation and of the part taken in it by the Royal College of Surgeons of England and of its President, the late Sir Rickman Godlee. Godlee was known as the godfather of the American College. The world knows what an influence for good has been wielded by the American College of Surgeons, how the College set to work to try to improve the standard of

surgery in America, how it inaugurated the standardization of hospitals with this end in view, and how it set its face against the obnoxious practice of fee splitting. This was brought about by the dogged determination of Franklin Martin. He has always been, to quote the words of George W. Crile, a constructive dreamer.

Some years ago Martin visited Australia with William Mayo and others, and he left behind him an impression of sincerity and worth. That those who do not know him may learn something of his ideals, we may quote a passage from his book in which he sets out the ideals of William and Charles Mayo; they are those on which Martin himself has acted:

> To succeed one must make good. To fulfil the tenets of his calling, a doctor must diagnose diseases accurately, and cure his patients. To accomplish this he must have knowledge. To possess knowledge of the science of medicine he must familiarize himself with the achievements of the most competent doctors; he must make frequent visits to the masters of surgery and witness their work; he must visit his confrères in other lands; he must know by comparison how nearly right he is, measured by the standards of his peers. When he discovers or achieves something that all medical men should know, he must be unselfish enough to present it at medical meetings, and to publish it in medical journals. He must learn to talk and he must learn to write—all of this that every patient may be benefited by every advance in medical science. His best friends should be his associates in medicine, his scientific books, and the people of all classes who come to him for aid. His recreation should be a change of work, and devotion to his calling should be his greatest pleasure.

In thanking Franklin H. Martin for his book, we would congratulate him on attaining his medical jubilee, and we join with the members of the medical profession throughout the Commonwealth of Australia in wishing continued prosperity and increased usefulness to the organizations that he was so largely instrumental in establishing.

Current Comment.

THE ÆTIOLOGY OF PELLAGRA.

For some time it was freely accepted by many authorities that pellagra was purely a deficiency disease, and, further, that the deficient factor was one of the vitamins whose distribution was known with reasonable accuracy. As time went on, however, more uncertainty was felt on the subject, as a simple deficiency in accessory food factors was apparently not always sufficient to produce the disease, and suggestions such as that of an additional factor, especially infection, were made. The parallel with sprue will here be recalled. One argument that has been used to combat the pure deficiency theory is that the results of therapy are not always as good as might be expected. But it should be observed that there are two possible fallacies to this objection. First, the effect of a vitamin deficiency may not always be reversible; that is, lack of a certain factor may predispose to or cause certain morbid states, but the administration of the appropriate vitamin may not terminate the train of evil thus begun. For instance, the lack of vitamin *A* may diminish resistance to infection, but liberal dosage of this substance will not positively increase it. Secondly, the exact food fraction containing the hypothetical factor may not have been as yet determined, so that feeding that is supposed to be rich in the necessary substance may actually in some instances be inadequate. To these may perhaps be added the suggestion that the known digestive disturbances of pellagra may make full absorption of the accessory factor difficult. In view of these conditions the assumption that pellagra is a true deficiency disease cannot be said to be disproved. This being so, we turn to the experimental field that has yielded so rich a harvest in the case of the other deficiency diseases. The disease known as "black tongue" in dogs is a condition that may be induced experimentally, and has been the basis of many studies. Its symptoms include glossitis, stomatitis, salivation and diarrhœa; and its distribution in time and place, its known cause, a vitamin *B* deficiency, and its usually effective treatment put it in the same category as pellagra. In fact, it is considered as the canine prototype of pellagra.

Margaret Crane-Lillie and C. R. Rhoads have presented a final reason why the two diseases should be regarded as belonging to the same category, if not quite identical.[1] The published reports of studies of black tongue have not presented definite and constant evidence of damage in the nervous system, and seeing that pellagra is associated with demyelinating lesions of the nervous system, it is important to know whether the same really holds good with this experimental disease of animals. These authors have examined the central nervous system of dogs fed with a special diet deficient in certain parts of the *B* vitamin complex, control animals being fed on the same diet with the addition of liver extract, which kept them in good health. As the disease may be quite acute in some such animals, some vitamin therapy was given at times, for nervous lesions would not be expected to be easily demonstrated unless in progress for some time. In most cases the animals survived some months, and in eleven out of the twelve dogs studied definite pathological changes could be demonstrated in the brain and spinal cord. There was some change in the nerve cells of a degenerative kind,

[1] *Archives of Pathology*, October, 1934.

swelling and fragmentation of the axis cylinders, and irregularity, swelling and shrinking of the myelin sheaths, where the greatest degree of disturbance was found. These results were obtained by modern neuro-pathological methods, particular care being taken to fix the brains and cords as soon after death as possible. The changes seen were not severe, but it was considered that there was reliable evidence of a general disturbance of the central nervous system. It would seem, therefore, that an even closer parallel than before exists between black tongue in dogs and pellagra in man. The exact ætiology of the canine disease appears to be rather uncertain. The diet of all the dogs contained rice polishings, which should have supplied vitamin *B*. The authors state also that lack of the thermostabile factor, known as B_2 or *G*, does not cause this syndrome, but that its appearance is due to the lack of some food factor frequently associated with vitamin B_2, but as yet unidentified. Here we seem to have additional evidence that there is reason to believe that pellagra is due to deficiency of the vitamin *B* complex, though whether there is merely one fraction of this that is responsible, or some other outside influence is also at work, is not positively established. In view of the fact that pellagra is occasionally seen in Australia, as in other parts of the world, for its distribution is world-wide, the subject is of distinct interest.

PROTRACTED ALLERGIC SHOCK.

SUDDEN death is sometimes still of obscure origin, and even deaths that occur after a rapid illness may be difficult to explain. Sudden death has been described as following acute allergic reactions due to physical agencies, such as cold, and in this category probably fall some of the cases of so-called "thymic death". For example, it has happened that an apparently healthy person has fallen into water and has been pulled out dead in spite of immediate rescue. These appear to be cases of physical allergy, and chemical allergy may probably also account for a few sudden or rapid fatalities. This subject is dealt with by George L. Waldbott in one of a series of articles on "Allergic Death", in which he discusses protracted shock due to allergy.[1]

In animals, acute anaphylactic shock is a phenomenon that is familiar to all, in theory if not in actual experience; in human beings it is fortunately rare, but its occurrence is known, though preventive measures have made it very rare. But it is not so well known that experimenters in the field of immunology are familiar with a condition in which protracted symptoms, such as dyspnœa, fever, diarrhœa, vomiting, stupor and general disturbance of well being, follow recovery from a non-lethal attack of anaphylaxis. It is interesting that guinea-pigs that have been sensitized to horse serum may exhibit signs and symptoms of a bronchopneumonia following on inhalation of the same substance. This is an aseptic lesion, and appears to be part of a protracted allergic reaction.

Waldbott records a number of illustrative cases. In two of these the patients had been subjected to intradermal tests for sensitiveness, and not only was the immediate local and general reaction severe, but symptoms recurred some hours afterwards, and a condition of mild bronchopneumonia persisted for some days. In each case there was contact with an irritant antigen, but removal of this did not produce prompt subsidence of symptoms. In another case an intravenous injection of typhoid vaccine was administered as treatment for iridocyclitis; four hours afterwards fever, dyspnœa and cough were observed, and the patient, a twelve year old girl, died some days later from bronchopneumonia. In the lungs were areas of massive intraalveolar hæmorrhage, and all the lymphatic tissues were hyperplastic and congested. Two other cases are quoted in which asthmatic patients suffered both immediate and protracted reactions following exposure to known allergens, in each case with symptoms of bronchopneumonia and pulmonary œdema. The last two cases described by the author are of particular interest, for in these death occurred without obvious external cause, but was of the so-called "thymic" variety. Both patients were infants. In each case an enlarged thymus was found, the lungs showed patchy infiltrative and hæmorrhagic change, and the fatal symptoms rapidly followed the ingestion of apparently harmless food. These cases are thought to illustrate rapid allergic death.

The purport of this article is to draw attention to this delayed and protracted series of symptoms due to allergic shock. Its interest does not lie only in an explanation of the rare cases of death following anaphylactic shock, but in the realization of the cause of such phenomena as more or less prolonged bronchopneumonic attacks following exacerbations of asthma. Such attacks may follow the incautious use of vaccines in asthmatics, as physicians are well aware, and it seems reasonable to believe that a unified pathological concept may cover all degrees of such conditions.

[1] *Archives of Internal Medicine*, October, 1934.

THE TRANSACTIONS OF THE FOURTH SESSION OF THE AUSTRALASIAN MEDICAL CONGRESS (BRITISH MEDICAL ASSOCIATION).

THE Transactions of the Fourth Session of the Australasian Medical Congress (British Medical Association), held at Hobart in January, 1934, will be published during the coming week. The Transactions, which have been edited by Dr. W. L. Calov, of Sydney, will be forwarded to all members of the session. The arrangement of the book is similar to that adopted in the Transactions of the Third Session. The whole of the work of typesetting, machining and binding has been carried out by the Australasian Medical Publishing Company, Limited, at the Printing House, Seamer Street, Glebe, New South Wales.

Abstracts from Current Medical Literature.

RADIOLOGY.

Generalized Carcinomatous Lymphangitis of the Lungs.

A. SCHWARZMANN (*Acta Radiologica*, July, 1934) describes two cases of generalized carcinomatous pulmonary lymphangitis. The development of this by no means rare disease is determined not so much by the location of the primary tumour as by the cancerous infiltration of the lymph glands of the hilum. This infiltration becomes the direct cause of blocking the lymph vascular system of the lung, and, in connexion with that, of cancerous infiltration of the whole of that system. The Röntgenological picture, on the other hand, shows typical changes in the form of dense hilum shadows and a markedly "stringed" design of both lungs, which dissolves itself into a tracing of fine meshes with scattered foci of greater opacity. As a rule the upper one-third of the lung is almost free from changes, while the lower two-thirds are particularly strongly involved. The diagnosis of carcinomatous lymphangitis, in spite of the indubitable importance of the Röntgenological findings, cannot be positively established until the existence of the primary tumour is ascertained and difficult respiration actually occurs.

The Expiratory Röntgenogram in the Diagnosis of Incomplete Pneumothorax.

SIDNEY GREENBERG (*American Journal of Roentgenology*, September, 1934) states that small pneumothoraces may escape detection when the film is made at the height of inspiration. In such instances a Röntgenogram taken at the end of forced expiration may often reveal the condition. The superiority of the expiratory film may be attributed to the fact that the volume of the pneumothorax remains practically constant during respiration, while the surface area of the pleural sac is altered, being increased on inspiration and decreased on expiration. These variations in the surface area of the pleural sac incident to respiration produce a definite change in the distribution of the pneumothorax. The Röntgenogram reveals that the layer of air about the lung becomes alternately thinner on inspiration and thicker on expiration. The shadow cast by the thin layer of air on inspiration may be completely obscured by the shadow of the lateral chest wall, whereas the relatively thicker layer of air on expiration is readily seen.

Dilatation of the Left Auricle to the Right.

JOHN C. RUDDOCK (*Radiology*, October, 1934), in discussing the radiological features of dilatation of the left auricle, states that the junction of the left border of the right auricle with the right border of the left auricle is on the posterior aspect of the heart, and to the right, at the point of attachment of the *vena cava* with the right auricle. In a case of compensated mitral stenosis in which only the left auricle is extremely dilated, this junction is pushed anteriorly and to the right, and at the same time the dilated left auricle obliterates the retrocardiac space. This pushes forward the right auricle, so that in extreme cases it lies almost entirely anterior. The Röntgenogram in the antero-posterior view will then show the projecting left auricle forming either a part, or the whole, of the right border of the cardiac shadow, and producing a sharply convex bulge to the right. The convex bulge is present because the lower portion of the junction of the right and left auricles is held stationary by the inferior *vena cava* as it comes through the diaphragm, and the bulging must take place above by pushing the superior *vena cava* forward and to one side. The maximum projection to the right is usually then some inches above the diaphragm level, and the cardiohepatic angle is thus acute. In extreme degrees of enlargement the left auricle may form the whole right border of the heart outline. In enlargement of lesser degree the left auricle projects to the right above the right auricle, which forms the lower part of the right border of the cardiac shadow. This is true only in cases of mitral stenosis without signs of decompensation. When decompensation is present, the left auricle cannot dilate beyond the dilated right auricle; we then have the same relationship that is present in the normal heart. The right border of the cardiac shadow is made by the right auricle, and the acute cardiohepatic angle is obliterated by the distended right auricle, and is visualized as a right or obtuse angle.

Redundant Duodenum.

MAURICE FELDMAN (*Radiology*, October, 1934) states that anomalies of the duodenum are far commoner than is indicated by a survey of the literature. Of these anomalies, the redundant duodenum is of especial interest. It is a condition in which there is usually an elongation of the superior portion of the duodenum, with a ptosis of the mid-portion of the superior segment, resulting in an anomalous loop. The duodenal cap or bulb is usually normal in size, but may occasionally be elongated. Beginning at the apex of the cap, the duodenum, instead of making a sudden drop to form the descending arm of the "C", is lengthened in its superior aspect, forming an extra loop. The descending arm of the duodenum is displaced to the right and posteriorly. Two angulations are observed in the superior duodenum; they are fixed by the hepato-duodenal and hepato-colic ligaments, which maintain this deformity. Inasmuch as there are two fixed points in the superior duodenum together with unusual lengthening, a ptosis in the mid-portion of the lengthened segment is produced, a loop characteristic of a water trap being formed. Duodenal stasis varying from a slight to a moderate degree was observed in every instance. This differs from the usual type in that it occurs only in the redundant loop. Duodenitis was found to be associated with this anomaly in a number of instances, while evidence of duodenal irritability was noted in all cases which came under observation. Gastric or duodenal ulceration was associated with the condition in slightly over 41% of the cases.

Saccular Aneurysm of the Thoracic Aorta.

E. BURVILL-HOLMES (*Radiology*, October, 1934) discusses the Röntgenological differentiation between mediastinal tumours and aortic aneurysm. A differential diagnosis cannot be made by noting on the fluoroscopic screen pulsations of the latter and their absence in the former. Pulsation of the sac is decidedly the exception rather than the rule, probably because when these cases come under observation the aneurysm has existed for a long time, and consists of a narrow channel with layer upon layer of dense laminated blood clot which intervenes between it and the sac wall, and even in a few cases in which pulsations are observed, it is often impossible to say whether the pulsation is expansile or transmitted. In practically all aneurysms there is a definite angulation between the outer limit of the sac wall and the left border of the heart. It may be a right angle or an obtuse angle. It may appear as a small arc of a circle. Perhaps the word "indentation" would be more descriptive. Furthermore, and this is of equal importance, there is the inability to trace the left border of the heart beyond the lower limit of the sac wall. The border of the heart fuses, as it were, with the dense shadow of the aneurysmal sac. Occasionally it can be traced beyond the latter, but, if so, only for a distance of from one to two centimetres. In contrast, in cases of tumour, this angulation is not present, and the borders of the heart can be traced from its apex to the aortic arch.

PHYSICAL THERAPY.

Post-Operative X Ray Therapy in Carcinoma of the Ovary.

JOHN B. MONTGOMERY AND JOHN T. FARRELL, JUNIOR (*Radiology*, August, (1934) report a series of 22 cases of carcinoma of the ovary under the care of Professor Brooks in the Gynæcological Clinic. All patients were operated on, and the condition was histologically diagnosed. There were four cases of adenocarcinoma, three of papillary adenocarcinoma,

fourteen cases of papillary cystadenocarcinoma, and one case of granulose cell carcinoma. Irradiation was begun two to four weeks after an operation, as extensive as possible, according to the grade of disease. Technique is given in detail; dosage was pushed to skin tolerance. Of the fourteen patients with papillary cystadenocarcinoma, seven are alive and one untraced, and four have been treated for over five years. The authors give tables of the cases grouped according to grade of disease, amount of irradiation and present results according to time factor. They summarize their results by saying that the hopefulness of prognosis is proportional to the grade of malignancy, and that in the totally inoperable or Grade V cases palliation of symptoms such as lessening of pain and œdema, not only made the patients more comfortable, but prolonged their lives, and that the more complete the removal, the better the prognosis in all cases.

Röntgen Therapy in Chronic Sinusitis.

FRANK E. BUTLER AND IVAN M. WOOLEY (*Radiology*, November, 1934) started treating patients suffering from chronic sinusitis in 1930, and have treated seven hundred. The rationale for selecting this form of treatment is that irradiation gives such excellent results from inflammatory hypertrophy elsewhere in the body. Experimental work was done by selecting twelve cats and injecting each right frontal sinus with a virulent hæmolytic streptococci culture taken from a mastoid. Two cats died within two days and all the others had definite infection. Three weeks were then allowed to pass, and the cats were divided into three groups. Group I consisted of three cats irradiated over both frontal sinuses with 800 *r* dosage. Group II consisted of three cats irradiated over both frontals with a dose of 1,600 *r*. Group III consisted of the four remaining cats and these were not irradiated, but left as controls. After another week one cat from each group was killed, and a second cat at the end of three weeks, and a third cat at the end of three months. The sinuses were exposed, and the anterior portions of the skulls were placed in Zenker-formol solution. Hardening, blocking and sectioning were then done. Another series of cats were prepared as before and killed in twenty-four, forty-eight and seventy-two hours following irradiation. The authors concluded that the X rays early destroyed the lymphocytes in the infected membranes, and about forty-eight to seventy-two hours after treatment of membranes there appeared to be an increase in the number of macrophages. These were believed to come in response to substances released by the breaking down of lymphocytes. These macrophages were seen to be laden with cellular *débris* and blood pigments. Possibly they also engulfed bacteria. The membranes became gradually reduced in thickness, but retained numerous plasma cells, polymorphonuclear cells and some histocytes. After a week or more some fibrosis appeared. Several weeks after irradiation, nodule-like masses of lymphocytes could be seen in some membranes, indicating a return of lymphocyte formation. There was no evidence of injury to the cilia, epithelium or cellular elements other than the lymphocytes as the result of X ray dosage. The fibrosis was considered to be a result of the inflammatory process and of the increase in the number of histocytes immediately following the infection. In the animals that were given the double dose there was in one instance some indication of abnormal activity of the epithelium. The authors realize that this experiment does not tell the whole story, because in human beings patients with acute infections were not treated. X ray dosage is given, and the authors have divided their cases into five groups: (i) Chronic infection with hypertrophic membranes, (ii) cases of polypi or cysts, (iii) atrophic types of membranes, (iv) chronic sinusitis with densely fibrotic membranes, (v) post-operative cases following unsuccessful radical surgery; they give case reports in each of these groups. They emphasize that X ray treatment has a definite place in the treatment of properly selected cases, and that there is no damage done to normal structures; and, if treatment fails, no interference exists with subsequent surgery.

Radiation Therapy in Carcinoma of the Bronchus.

SAMUEL M. BAUM (*Radiology*, October, 1934) states that in the extensive literature now existing concerning carcinoma of the lung, most of the authors name surgery (lobectomy) as the treatment of choice. This choice is limited, however; the opinion is universally expressed that only comparatively early cases are suited for lobectomy, and that the insidious nature of lung carcinoma makes early diagnosis practically impossible. Comparison of statistics also shows that lobectomy, when done for benign conditions, carries with it a high mortality (from 20% to 30%). Radiation by Röntgen ray and radium has no immediate mortality. Many writers mention that even if life is not prolonged by radiation therapy, the patient's sufferings are greatly lessened, and what life remains to him is made more endurable. A number of isolated cases have been reported in which the progress of histologically proved primary carcinoma of the lung has been halted by radiation, the patient remaining in good condition for some months—too short a time to permit any claims of permanent cure. Leddy and Vinson report ten patients who, after having received Röntgen therapy alone, are living and well from fifteen months to four years after the diagnosis. Kernan reports four patients without any evidence of carcinoma, and two clinically well, but showing some remains of the lung tumour Röntgenographically. As these represented 25% of the first series and 66% of the second, these results are certainly equal to those of surgery. There would seem to be justification for the conclusion that irradiation is to be preferred in the treatment of lung carcinoma, as it offers greater possibility of cure in the early cases, for the following two reasons: (i) The indications for its use are much less restricted than those of surgery. (ii) In advanced cases, beyond hope of cure by any means, it affords a far greater degree of palliation than can be otherwise obtained.

Pre-Operative X Radiation in Kidney Tumour in Children.

A. RANDALL (*Annals of Surgery*, September, 1934) refers to the hopeless prognosis in kidney tumours of children, and on reviewing some of the literature shows that it is very unusual for a patient to survive more than ten months after operation. This hopeless outlook was apparently bettered some time ago by the benefit seemingly obtained by competent deep X ray therapy. Under this therapy these embryonic tumours seem to melt, and there is hardly a more brilliant therapeutic result demonstrable than the improvement so obtained. Time, however, told a disappointing sequel, for, though the primary effect was startlingly good, the inevitable recurrence took place, and with each return the effect of irradiation decreased in its ability to control growth. Today this is interpreted by suspecting two factors: first, that the youngest embryonic cells are excessively radiosensitive, and, secondly, that persistent undestroyed cells become increasingly radio-resistant. The author then reports three cases treated with X radiation before surgery. In each case the tumour became very much smaller and operative interference was made easier. In the first case, operation was delayed past the optimum period, and the tumour had increased in size once more. Death occurred six months after operation. In the second child, previous exploration had been made and the growth was considered inoperable. X ray therapy was given, and ten weeks later the tumour, very much decreased in size, was removed. The pathological report was a mixed cell tumour of the kidney with displacement fibrosis from Röntgen therapy. Two years later this patient died from bronchopneumonia. A complete *post mortem* examination was made, and no evidence whatsoever could be found of neoplastic tissue in any portion of the body. The third patient's surgical history follows that of the second case, except that ten months later there is no evidence of any recurrence. The author in his conclusions mentions that pre-operative irradiation should include chest and abdomen in an effort to create an unfertile field for metastatic transplants.

British Medical Association News.

SCIENTIFIC.

A MEETING OF THE QUEENSLAND BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the British Medical Association Building, Adelaide Street, Brisbane, on November 2, 1934, DR. W. N. ROBERTSON in the chair.

The Diagnosis and Treatment of Intracranial Tumours.

DR. ELLIS MURPHY read a paper entitled: "The Diagnosis and Treatment of Intracranial Tumours" (see page 139).

DR. NEVILLE G. SUTTON read a paper entitled: "The Treatment of Intracranial Tumours" (see page 142).

DR. JOHN BOSTOCK congratulated the two lecturers on their papers. In the time at their disposal he thought they had given a very good survey. Dr. Bostock considered it an excellent thing to direct attention to this branch of medicine and surgery. When one heard Dr. Murphy's discourse, the subject seemed rather easy, facts and symptoms being so obvious, but in actual practice the diagnosis as to the actual presence of a tumour and its site was one of extreme difficulty. There were not only real tumours, but phantom tumours, in which cases the patient would have all the symptoms of a localized tumour, but at operation no tumour could be found. Some patients operated on did very well, but it was very difficult to give a prognosis and diagnosis. He cited two of his own cases seen within the last few days; one in which removal of a tumour gave an excellent result; in the other, which superficially had a better prognosis, the patient was still an invalid.

Discussing diagnosis, he stressed the need for stereoscopic X ray pictures, and the necessity for using such simple procedures as shaving the entire scalp. The surgeon's part was beset with difficulties, and Dr. Bostock expressed his admiration for anyone who took up cerebral surgery, as it was heart-breaking and back-breaking work. He thought cooperation was necessary to bring the patients early. One must get at the original signs as soon as possible, as it was a tragedy to see these patients handed over to the neurologists only after they had lost their sight. Early diagnosis would save great suffering and was absolutely essential.

DR. S. F. MCDONALD thanked the two authors for their papers, and hoped that they would do a considerable amount of good. There was no doubt that there were quite a number of unfortunate people with cerebral tumours which were undiagnosed, simply because the practitioner did not think of a tumour. He agreed with Dr. Murphy that a severe and persistent headache should always suggest a cerebral tumour. The point in differential diagnosis was that many of these were diagnosed as encephalitis, and practically nothing was done. It was important to remember that papilloedema was practically never present in encephalitis. Another very important condition in Queensland apt to be confused, was lead poisoning with ocular symptoms. He had seen at least two cases in children who had been persistently treated for lead poisoning for weeks, with of course no benefit, and with final termination with obvious tumour conditions. A positive reaction to the Wassermann test by no means always meant that the cerebral condition was syphilitic in origin, and the presence of increasing papilloedema did not justify the attitude of expectancy even in the presence of such a reaction.

Dr. McDonald expressed his appreciation of Dr. Sutton's paper and of his surgical work.

DR. A. E. LEE offered his congratulations to the two speakers. He had been interested in the surgery of cerebral tumours for some years, and had had the opportunity of operating in a good many cases. There were many points in diagnosis and treatment he would have liked to discuss if there had been time.

Dr. Lee had operated on eighteen patients in whom tumours had been found at operation or verified at autopsy. Three of these patients were probably permanently improved: one had a parasagittal meningioma removed four years ago, the second had a frontal astrocytoma removed two years before, and the third had an acoustic neurinoma partially resected five months ago. Of the other fifteen, three were prefrontal tumours; in two cases the lesion was not revealed at operation, but at the autopsies some months later infiltrating *glioblastoma multiforme* tumours were found, lesions which were not amenable to surgery. This tumour had been suspected in the third case, and operation was limited to a subtemporal decompression. At the autopsy it was found that the tumour had infiltrated from one frontal pole to the other.

There were three cases in which the tumour was found in the frontal cortex, in addition to the case already mentioned. One was completely removed, but the patient, who was in excellent condition, suddenly died some twelve hours later, perhaps from a hæmorrhage into the ventricle. In the second case, one of the earliest in his series, an astrocytomatous cyst in the post-rolandic area was drained, and the patient, after remaining perfectly well for ten days, developed temperature fluctuations, finally dying on the sixteenth day from hyperthermia. In the third case, an enormous encapsulated tumour, perhaps a parasagittal meningioma, was disclosed, and it was decided to defer the removal to a second stage. In the intervening period the patient became stuporose, and did not become sufficiently well again for the removal to be attempted. This patient illustrated the important fact, which an acoustic neurinoma later to be mentioned also showed, that cerebral operations must be completed in one stage. At the second operation it took just as long, and there was as much bleeding as if one had never carried out the first stage. The patient should be kept in condition by blood transfusion and the operation completed, however long drawn out and difficult it might be.

There had been one patient with a temporal lobe tumour; he was seen late in the course of his illness, and the secondary pressure phenomena led to a subtentorial exposure being erroneously made. Dr. Lee thought this was the only case in which such a wrong diagnosis had been made.

Other supratentorial lesions included a hæmangiomatous malformation over the parietal cortex, in which no attempt at treatment had been made; and a pituitary tumour into which radon seeds were implanted by the transfrontal route.

Subtentorial tumours included a second acoustic neurinoma, in which the operation was unwisely staged, the patient dying from œdema of the brain stem, two cystic astrocytomata of the cerebellum and a pontine glioma, disclosed at autopsy. This illustrated the interesting fact that papilloedema might be practically absent in pontine lesions. One of the children with a vermis tumour remained well for two years, dying after removal of the remaining tumour mass in London.

As mentioned by Dr. Sutton, hypertonic saline solution had dramatic effects in post-operative œdema. In one patient, when respiration had practically ceased from œdema of the brain stem, 60 cubic centimetres of 15% saline solution would have the patient talking sensibly in ten minutes; within a few hours, however, the procedure would have to be repeated, with steadily lessening results.

These personal results made a fairly gloomy picture, but with the increasing care and knowledge that experience brought, similar patients would in future be saved.

Dr. Lee again emphasized that there must be no staging of the operation. He agreed with Dr. Sutton that local anæsthesia, with some form of prenarcosis (he had recently been using "Avertin"), was the best. These cases were difficult to diagnose completely, and the final results were such that in other parts of the body would not be considered satisfactory.

DR. C. E. WASSELL congratulated the two speakers on their papers. He agreed with the difficulty as to diagnosis, and pointed out that cerebral abscess came into the differential diagnosis very materially.

DR. L. BEDFORD ELWELL congratulated the speakers on their very interesting papers. He agreed with Dr. Murphy on the importance of generalized epileptiform convulsions as a prelude to other symptoms of cerebral tumour. He had seen a case with Feiling at Saint George's Hospital in which convulsions were the only symptom of cerebral tumour for ten years. Feiling stated that it was the longest time that he had known of personally, although a case had been recorded of twenty years' duration. Another early sign of cerebral tumour was slight facial weakness on one side. Adie gave two early signs of importance, namely, the absence of Léri's forearm reflex or of Mayer's finger-thumb reflex, both of which, he stated, were present in most normal subjects. Adie said that again and again absence of Mayer's reflex had been in his experience the first herald of a cerebral tumour, often many weeks before any other sign.

DR. J. LOCKHART GIBSON had listened with great interest to both papers. He agreed very strongly with Dr. Ellis Murphy on the importance of a careful perimetric examination of cases (of papillœdema) suggesting cerebral tumour. Valuable evidence could often be gained in the case of commissural, temporal lobe or occipital lobe tumours. Failure to find field defects might sometimes exclude these regions. He deprecated the conclusion that a syphilitic lesion did not exist because the Wassermann test failed to give a reaction. A "negative" result should be disregarded in a case in which clinical evidence indicated syphilis as a possible cause. It had been his good fortune to find "positive" Wassermann reactions confirmed by treatment. In an urgent case, and before resorting to surgery, thorough inunction with confinement to bed should be begun before the result of a blood examination came to hand. Convincing evidence could be obtained within four days in cases of plastic iritic exudation. In cases of papillœdema due to gumma or to gummatous meningitis something would be learned within a week.

Referring to Dr. S. F. McDonald's remark about cases of papillœdema due to lead, Dr. Gibson mentioned the case of a child under his care at the Hospital for Sick Children with double papillœdema and paralysis of an external rectus muscle. As ocular plumbism in children was common, the provisional diagnosis was lead. The child was removed from her home. She was treated with magnesium sulphate and sulphuric acid and after a week with iodide of potassium. (It was prior to his adoption of a lumbar puncture as routine treatment in these cases.) The eye condition failed to improve, but did not advance. After more than two months—too long, he admitted—he began to inunct the child, and within a month the papill-œdema had disappeared and the squint also. Vision was $^6/_6$ in one eye and $^6/_9$ in the other. Dr. Gibson also mentioned the case of a woman of forty years, which he had recorded many years ago. She had all the symptoms of cerebral tumour, but recovered promptly under inunction, lived for fifteen years, and bore two healthy children. She had kept well, with vision of $^6/_6$ for twelve years. She had followed up treatment for four years and had then become slack. She died after fifteen years from a cerebral lesion, he thought because intermittent treatment had not been continued. Dr. Gibson alluded to an interesting and sometimes helpful point in connexion with hemianopsia, applying more to hæmorrhage than to cerebral tumours. In a lesion of the visual path the visual memory centre was intact, but received no messages; whereas when the visual memory centre was destroyed, the visual path, though intact, could bring no messages to it. It was found that with a path lesion the patient worried because his half fields could not function, and the visual memory centre recognized this. When the centre in the calcarine fissure was destroyed, though the half fields were lost, he appeared to worry very little. When the lesion was in the visual path and the centre was intact, visual hallucinations in the lost half fields might be experienced, no doubt as a result of visual memories formed in the calcarine cortex prior to the interruption in the visual path.

DR. ALEX. MURPHY thanked the speakers for the wealth of information they had conveyed in a very short time. He considered cerebral localization was one of the most difficult things in medicine. He had had a patient in hospital with all the textbook features of disseminated sclerosis, including euphoria. The cerebro-spinal fluid was under normal pressure. The patient had refused to remain in hospital, but six weeks later he was readmitted comatose. He died, and at autopsy it was found that he had a tumour in the occipital lobe the size of a hen's egg. Dr. Murphy stressed the fact that a manometer must be attached to a syringe and used when a lumbar puncture was being done, otherwise one could not say whether the fluid was under increased pressure or not, except in extreme cases.

Dr. Ellis Murphy, in reply, said that Dr. Bostock had mentioned the difficulty in diagnosing these conditions; he quite agreed. Dr. Murphy was not a believer in phantom tumours; he thought there either was a tumour or there was not. If the clinical signs of a tumour were found, it was a hundred to one a tumour was present. Dr. Murphy quoted the history of a patient who had suffered for three weeks from severe headaches and vomiting; there was a progressive increase of symptoms, and the patient was admitted to hospital with a diagnosis of influenza. On examination, the patient was found to be listless, with cerebral anæmia and with an increased intracranial tension, loss of abdominal reflexes and nystagmus to the right side. The right knee jerk was active, the left not active. There was some facial paralysis. The cerebro-spinal pressure was under 400 millimetres of water pressure; there was no deafness. A diagnosis was made of a tumour in the posterior intracranial fossa. The Wassermann test gave a positive reaction, but there was no improvement in the patient's condition with antisyphilitic treatment. An operation was performed, but no tumour was found, and the patient died in forty-eight hours. At autopsy there was found a medulloblastoma of the pons which was not seen at all from the posterior operative wound. In a second case where the tumour was not found, it was probably deep in the optic thalamus. Dr. Murphy stressed that there was not the knowledge or experience here for dealing with these cases, and thought this accounted for many phantom tumours. He mentioned the condition of arachnoiditis—œdema of the arachnoid—which often improved after operation.

In reply to Dr. S. F. McDonald, Dr. Murphy agreed that encephalitis had also to be considered, but one could be guided by the intracranial pressure (which must be taken with a manometer attached to the spinal needle), as the pressure rose in encephalitis only for the first few days. With the exception of advanced anæmia or arterio-sclerosis with a very high blood pressure, Dr. Murphy thought a very high intracranial tension always pointed to some intracranial neoplasm.

Replying to Dr. Wassell, Dr. Murphy said a cerebral abscess always had to be thought of, though probably most of them followed on sinus trouble, and were more common in ear, nose and throat practice. Dr. Murphy said that his paper was merely a short survey of the subject, and was meant to draw the attention of practitioners to the prevalence of cerebral tumours.

Dr. Sutton thanked the members for their reception of his paper. He thought that some of the so-called survivals of operation were very encouraging, a few patients being back at work. One of these was a postman who had a history extending over seven years, being unable to work for eighteen months; after removal of an acoustic tumour he had been back at work, it being now twenty-one months since his operation. Another was a youth who had survived seventeen months after operation on a cerebellar cystic astrocytoma, and was back at work on a dairy, still well.

Dr. Sutton said he had omitted to discuss the staging of these operations; he quite agreed with Dr. Lee on this point, operation should be completed in one stage if

at all possible; it had been amply proved that the death rate was considerably higher with two-stage operations.

Dr. Sutton said he would feel amply repaid for his efforts if he had been able to arouse the interest of members in this subject.

A MEETING OF THE NEW SOUTH WALES BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held on August 23, 1934, at the Lewisham Hospital. The meeting took the form of a series of clinical demonstrations by members of the honorary staff. Part of the report of this meeting was published in the issue of January 12, 1935.

Addison's Disease.

DR. LEO FLYNN showed a male patient, aged sixty-six years, who was admitted to hospital under the care of Dr. Wilfred Evans on February 28, 1934. The patient complained of weakness and prostration, being unable to sit up, of about four months' duration. There was also considerable nausea and vomiting. Physical examination revealed increased pigmentation of the skin and buccal mucous membrane. Auricular fibrillation was present. The systolic blood pressure was 90 millimetres of mercury and the diastolic pressure 70 millimetres. The blood count revealed the red cells to number 5,100,000 per cubic millimetre. The hæmoglobin value was 92% and the colour index 0·9. The white cells numbered 7,800 per cubic millimetre. An X ray examination of the suprarenal areas revealed no shadows of calcium density, and the renal areas were normal in size and position.

Treatment was commenced with intramuscular injections of "Eschatin", three cubic centimetres, once a day for three days, followed by the "Eschatin" injection of one cubic centimetre once a day for three weeks and thereafter less frequently. Digitalis and quinidine were administered for the cardiac condition.

About three months ago the patient was advised to take liberal quantities of sodium chloride in his diet, and he now managed to take about four teaspoons of salt over and above that used in the cooking of his food.

Dr. Flynn said that the patient's general condition was satisfactory. He could get about a little, and his cardiac rhythm was normal. His systolic blood pressure was 125 millimetres of mercury and his diastolic pressure 80 millimetres. His present treatment was one intramuscular injection of one cubic centimetre of "Eschatin" every week and large quantities of sodium chloride daily.

Carotinæmia.

Dr. Leo Flynn also showed two patients who were suffering from carotinæmia.

The first was a woman, aged forty-six years, who had been advised to take a low carbohydrate diet during the treatment of her rheumatoid arthritis; she had eaten liberal quantities of greens. The lipochrome index was 11·1.

The second patient was a man, aged sixty-three years, who had been treated for *diabetes mellitus* for four years. His diet had included large quantities of greens *et cetera*. His lipochrome index was 9·2.

Both patients showed the characteristic pigmentation of palms of hands and soles of feet and to a lesser degree of the naso-labial folds.

Acute Septic Arthritis of the Knee.

DR. JOHN HOETS showed a lad, aged fourteen years, who fell from a swing on April 1 and landed on his feet. The hips and knees were flexed, and a tooth penetrated the suprapatellar bursa (left). He was admitted to hospital one week later with the knee distended with pus, which was also oozing from the small penetrated wound. Incisions were made on either side of the patella and also into the lower part of the joint on either side. Inflammation spread under the quadriceps, the lower part of the femur being completely surrounded with pus. Abscesses formed also in the leg under the muscles in the anterior compartment and also under the peroneals laterally. The organism responsible was a hæmolytic streptococcus. The leg from the first was suspended on a Thomas splint. Dressings caused extreme pain, the slightest movement of the bed giving rise to great distress. The charts showed temperature ranging between 38·3° and 40° C. (101° and 104° F.), and the pulse rate up to 160 for several weeks.

The patient's condition was so serious that amputation, which was advised in consultation, would have probably ended fatally. It was decided to remove all drainage tubes and put the limb at rest in plaster. Under anæsthesia the tubes were removed and a plaster of Paris cast from the groin to the ankle was applied over dressing pads. The effect was immediate; sleep and appetite returned, and the general condition improved. The initial plaster was left on for a week, at which time it was completely sodden with discharge, pus running out at the ends of the plaster. The odour was very heavy. The dressings were done at weekly intervals at first, and later at intervals of two and three weeks. The present condition was very satisfactory; the sinuses had all practically healed, the general condition was good, the knee was ankylosed and painless. The case emphasized the extreme value of rest in the face of infection, even when many sinuses freely discharging were present.

It was felt that the boy would have succumbed but for the change of treatment adopted.

The Smith-Petersen Nail in Fracture of the Femur.

Dr. Hoets showed two cases demonstrating the use of the Smith-Petersen nail in fractures of the femoral neck in elderly people.

The first patient was a woman of seventy-four years, who sustained a fracture of the outer portion of the neck of the femur. The reduction was effected and X ray examination made while the patient was on the table revealed good position. An 8·75 centimetre (three and a half inch) Smith-Petersen nail was introduced through a small incision just below the great trochanter. Another X ray examination showed the nail to be in good position. The patient was returned to bed without any splinting, and had been apparently comfortable the next morning, and was able to move the leg passively without pain. On the second day she was placed in an armchair beside the bed, where she sat in perfect comfort. On the twelfth day it was suggested that crutches be obtained for her to try to walk. She had ridiculed the idea of crutches and stood without help, except that derived from holding the foot of the bed, and she walked without assistance. She refused to try either crutches or stick, and returned home three weeks from the accident. She had remained quite comfortable, and was able to walk with a little assistance.

The next patient was a man, aged seventy-six years, who had sustained a fracture through the middle of the neck of his right femur. He had been placed in a Whitman plaster, X ray examination showing reduction to be good. Two days later he had pulmonary embolism, and his distress necessitated some degree of loosening of his plaster. He recovered from this attack, but subsequent X ray examination showed that he had lost the original good position and absorption was occurring at the site of the fracture. At the end of three months the plaster was removed, and, no evidence of union being present, an operation was decided upon. Spinal anæsthesia was attempted, but was unsuccessful owing to the inability to flex the spine following the three months' recumbency. Under ether anæsthesia the hip joint was exposed from an anterior incision, the ends of the fractured bone were cleared of fibrous tissue, placed in apposition, and a Smith-Petersen nail was introduced. The wound healed without trouble, and at the end of a fortnight the patient was allowed up. Three weeks from operation he was able to progress with the aid of crutches, his main difficulty being some stiffness of the knee which occurred during his period in plaster. He left hospital a month from the operation, deeply regretting his three months' waste of time in plaster.

Dr. Hoets said that neither patient had yet shown evidence of union, but they demonstrated sufficiently well the great advance as regards the comfort of the patient

and avoidance of the dangers inseparable from any method requiring lengthy periods of recumbency in elderly people. The complete absence of discomfort in the hips fixed in this way was remarkable.

Unusual Injury to the Knee Joint.

DR. R. V. GRAHAM showed a patient who on August 1, 1934, was striking a cold chisel with a hammer weighing fourteen pounds. He suddenly felt pain over the medial side of the right knee joint, which increased greatly in intensity prior to his admission to hospital.

On admission he had a small incised wound about 1·25 centimetres (half an inch) long just medial to the edge of the patella, the joint being distended with fluid. A radiographic examination revealed an irregular, opaque foreign body which appeared to be embedded in the medial condyle of the femur. The knee joint was opened on the medial side, where it was found that the foreign body was a portion of the cold chisel which had traversed the knee joint, incising the upper surface of the medial meniscus in transit and finally embedding itself completely to a depth of about 1·25 centimetres (half an inch) in the medial condyle of the femur. This piece of steel was approximately 12 by 9 millimetres, and was about as thick as a knife blade. The edge of the fragment was flush with the articular cartilage, and it was so firmly embedded that it had to be levered out with a chisel. The knee joint was gently swabbed to remove the blood clot, and then filled with one in 2,000 aqueous solution of acriflavine and sutured. The patient's convalescence was uneventful, and he now had full movements.

Compound Fracture of Humerus.

Dr. Graham's second patient was a man who had been admitted to hospital on May 19, 1934, with a compound fracture of the lower end of the right humerus, which was roughly T-shaped, the lower end of the humerus being divided into two fragments, separating the articular surface of the radius and ulna respectively. The fracture was compound at the posterior surface of the humerus about 6·25 centimetres (two and a half inches) proximal to the olecranon process. At the first operation the edges of the wound were excised, all damaged tissue was removed, and the wound was swabbed out with one in 2,000 aqueous solution of acriflavine, sutured and supported temporarily on a Jones arm splint with traction on the lower fragment. Ten days later, the wound having united by first intention, an incision was made through the lateral portion of the brachialis extending down into the forearm, through which the two lower fragments of the humerus were found to be separated by an interval of about 2·5 centimetres (one inch). These were levered into position and united with a stainless wire, the upper end of these fragments being then united to the upper end of the humerus by a stainless wire. Early active movements were instituted, and the patient at the time of demonstration had about 100° of movement, with full range of pronation and supination.

Paget's Disease of Ulna.

MRS. F., aged sixty-five years, with Paget's disease of the left ulna, had a history of swelling and pain over the upper end of the left ulna for one and a half years' duration. On examination the skin was rather dusky over the subcutaneous portion of the ulna. There was definite bowing and tenderness on pressure. A radiographic examination revealed Paget's disease extending down the left ulna, with no involvement of other bones. A test meal disclosed achlorhydria and a serum calcium examination showed that the calcium level was 11·3 milligrammes. She was put on a diet rich in calcium, and given dilute hydrochloric acid and "Adexolin". Her general condition had improved, the pain had disappeared, but up to the time of the demonstration there had been no appreciable increase in the calcification of the ulna.

End Result of Spinal Fusion for Tuberculosis.

A male, aged forty-five, complained of persistent pain in the back four years ago. Radiographic examination revealed absorption of the contiguous margins of the first and second lumbar vertebræ and the intervening intervertebral disks; there was no definite clinical deformity. A spinal fusion was performed after the Hibbs method, in which the eleventh and twelfth dorsal, first, second, third and fourth lumbar vertebræ were fused. The patient wore a celluloid jacket for six months, after which time he resumed his occupation of telegraph linesman. There was now solid bony fusion, and he had lost no time from work in the past four years. A radiograph taken in July, 1934, demonstrated bony fusion between the affected vertebræ and those above and below.

Osteomyelitis of the Tibia.

A child of four years had been treated by the Winnett-Orr method. She had been suffering from osteomyelitis of the tibia of ten weeks' duration prior to admission to hospital. The shaft of the tibia was involved in its entire length, and there was a large granulating area freely discharging pus from various sinuses. Radiographic examination disclosed osteomyelitic changes present, with practically complete destruction of the whole of the tibia; the fibula and lower end of the femur were free from osseous change. At operation the posterior dislocation of the left knee joint was reduced, the granulating area was cleaned up and acriflavine and vaseline were applied, and the whole lower limb was put in plaster with the knee joint in flexion. The plaster was changed every three weeks, and the temperature and pulse rate gradually fell. Within three months the granulating area, which had been about 12·5 by 7·5 centimetres (five inches by three inches) was covered with epithelium, and at the time of examination there was one small sinus present.

Dermatological Conditions.

DR. J. WITTON FLYNN showed the following cases.

1. A case of multiple carcinoma of the skin. There had been over thirty growths, all on the exposed parts of the body. The patient was shown on account of the number and extent of the lesions, also to demonstrate the excellent results of radium therapy.
2. A case of *lupus erythematosus*, showing the results of treatment by gold salts.
3. A case of neuro-fibromatosis (von Recklinghausen's disease).
4. A case of *mycosis fungoides* that had practically cleared up with X ray therapy.
5. A case of *acanthosis nigricans*.
6. A case of *alopecia totalis* of two years' duration, in which hair had completely returned.

ANNUAL MEETING OF THE BRITISH MEDICAL ASSOCIATION, MELBOURNE, 1935.

THE following letter has been received from the Section of Obstetrics and Gynæcology of the annual meeting of the British Medical Association, to be held at Melbourne in September, 1935:

BRITISH MEDICAL ASSOCIATION

103rd Annual Meeting, Melbourne, 9th-14th September, 1935.

Medical Society Hall,
Albert St.,
East Melbourne, C.2.
17th January, 1935.

SIR: In connexion with the Section of Obstetrics and Gynæcology of above meeting, the Australian echelon of the Executive desires you will be good enough to publish a request for contributors of occasional papers to nominate forthwith or as soon as possible. Prospective contributors may nominate to any of the undersigned, but should note that no offer is thereby necessarily accepted. Occasional papers should not be on any of the following subjects: "The Present Position of Cæsarean Section in Obstetric Practice", "Placenta Prævia", "The Prevention and

Prognosis of the Late Toxæmias of Pregnancy", "The Late Results of Pelvic Inflammation". Contributors should note also the following extract of "Rules for Speakers":

Readers of Occasional Papers.—These shall be allowed 15 minutes (say 1,500 words). Occasional papers are not printed beforehand, and cannot be "taken as read". If not read at the meeting they form no part of the proceedings of the Section.

It should be noted that the text of the opening paper of a discussion and any occasional papers that may be accepted and read are the property of the British Medical Association, and may not be published elsewhere than in *The British Medical Journal* or THE MEDICAL JOURNAL OF AUSTRALIA without special permission. Speakers should realize that to continue speaking beyond their authorized time shows a lack of consideration for subsequent speakers.

Lanterns and Epidiascopes.—It is most important that any speaker requiring a lantern or epidiascope to illustrate his remarks should notify the Sectional Honorary Secretary at an early date. It is exceedingly difficult, and sometimes impossible, to satisfy demands made for these instruments at the last moment.

Yours, etc.,

R. MARSHALL ALLAN (Vice-President of Section), University of Melbourne, Carlton, Victoria.

J. C. WINDEYER (Vice-President of Section), 235 Macquarie Street, Sydney, N.S.W.

ROBERT FOWLER (Honorary Secretary of Section), 85 Spring Street, Melbourne, Victoria.

A. ROBERTA DONALDSON (Honorary Secretary of Section), 88 Collins Street, Melbourne, Victoria.

NOMINATIONS AND ELECTIONS.

THE undermentioned have been nominated for election as members of the New South Wales Branch of the British Medical Association:

McLaren, Alexander Wright, M.B., 1932 (Univ. Sydney), c.o. Dr. Kirkwood, Epping.

Schreiber, Marcel Sofer, M.B., B.S., 1931 (Univ. Sydney), The Women's Hospital, Crown Street, Sydney.

Medical Societies.

THE AUSTRALIAN SOCIETY OF ANÆSTHETISTS.

WE have been asked to announce that membership of the Australian Society of Anæsthetists is open to all members of the British Medical Association who hold, or have held, an honorary anæsthetic appointment in a recognized public hospital in Australia.

Intending members are invited to communicate with the Honorary Secretary, 14 Collins Street, Melbourne, C.1, Victoria.

Medical Practice.

THE TRANSMISSION OF BACTERIOLOGICAL AND PATHOLOGICAL SPECIMENS BY POST.

THE following communication, received from the Deputy Director of Posts and Telegraphs, is published for the information of medical practitioners:

SIR: As it has been revealed that difficulties would arise and inconvenience would be sustained by stock-owners were the stipulations relative to the transmission by post of bacteriological or pathological specimens applied in their entirety to live virus vaccines, it has been decided to amend Postal Rule 151 by including therein separate and distinct conditions under which vaccine may be transmitted.

Consideration was also given to the transmission by post of samples of urine, and as the rigid application of the conditions relating to bacteriological and pathological specimens to these samples would cause inconvenience, it has been decided to permit them to be transmitted by post under certain conditions.

Attached is a copy of the rules now laid down which will be promulgated in the January, 1935, Supplement to the Post Office Guide. Your cooperation in publishing them in your journal for the information of those concerned or interested would be greatly appreciated by this department.

Yours faithfully,

H. C. HOPKINS,
For Deputy Director, Posts and Telegraphs.

Rule 151—Bacteriological and Pathological Specimens.

Within the Commonwealth—

1. An article containing any bacteriological or pathological specimen will not be accepted for transmission, or, if found in the post, will not be delivered unless addressed to a laboratory which has been registered by the Postmaster-General.

2. Applications for registration by the Postmaster-General of laboratories to which bacteriological or pathological specimens may be sent for examination must be made on the proper form, copies of which may be obtained from the Deputy Director, Posts and Telegraphs, of a State.

3. Bacteriological or pathological specimens addressed to laboratories registered by the Postmaster-General may be accepted for transmission under the following conditions, *viz.*:

(*a*) On the outside of every such article there must be written or printed the words "Specimen for Medical Examination".

(*b*) The liquid or substance forwarded for examination must be enclosed in a receptacle hermetically sealed, which receptacle must itself be placed in a strong wooden or metal case, in such a way that it cannot shift about, and with a sufficient quantity of some absorbent material (such as sawdust or cotton wool) so packed about the receptacle as absolutely to prevent any possible leakage from the package in the event of damage to the receptacle. The lid of the box must be fixed in such a manner that it cannot easily be detached.

(*c*) The article must not be sent by parcel post, and except as provided in subparagraphs (*d*) and (*e*), the article must be registered and not dropped into a letter box. Any article of the kind found in the parcel post, or any article of the kind, whether registered or not, found in the post, not packed as directed, shall be deemed to be posted in contravention of the *Post and Telegraph Act*, and dealt with accordingly.

(*d*) In the case of throat swabs which are not obtained in time to permit the sender to hand the article in at a post office for registration, owing to the post office having closed for the day, the specimens may be transmitted by ordinary post, provided they are properly packed in accordance with subparagraph (*b*), and the article bears an endorsement by the sender that the specimen enclosed was obtained too late to permit the sender to hand the article in at a post office for registration.

(*e*) Bacteriological or pathological specimens posted by duly qualified medical practitioners and duly qualified veterinary surgeons may be sent by ordinary post, provided that the rules as to packing as prescribed herein are rigidly adhered to, and that the outside of the postal article is endorsed by the sender with the words "Specimen for Medical Examination—Packed as Prescribed", followed by the sender's signature, and the usual abbreviation indicating that the sender is a qualified medical practitioner or veterinary surgeon.

Vaccine.—1. Live virus vaccine must be enclosed in a thick glass container hermetically sealed. The container must be surrounded with an absorbent substance in sufficient quantity to protect it from breakage and to absorb all the liquid in the event of it being broken. The container and its protective covering must be securely packed in another container of metal, wood, strong corrugated paper or other suitable material. The outside cover must bear the name and address of the sender and an endorsement indicating the nature of the contents of the package.

2. The distribution and use of live virus cultures are subject to the provisions of the State laws, and the responsibility for observance of those laws lies with the persons concerned in such distribution and use.

Liquids.—Provided the following conditions are complied with, samples of urine may be forwarded by unregistered post to registered medical practitioners or to public hospitals and clinics, as well as to the registered laboratories mentioned in Rule 151:

> Samples of urine must be enclosed in thick glass containers so closed that none of the contents can escape through the opening. The container must be surrounded with absorbent material, such as wadding or cotton wool, in sufficient quantity to protect it from breakage and to absorb all the liquid in the event of the container being broken. It is desirable also that the packing should be surrounded by strong corrugated paper. The container with the prescribed protective packing must be enclosed either in a strong wooden box or metal canister, which should be wrapped in strong paper securely fastened. The covering of the package must bear the name and address of the sender and an endorsement that the package contains liquid. Owing to the danger of breakage the package should not be dropped into a letter box, but should be handed in over the counter of a post office for dispatch.

The Postal Department exhorts doctors to impress upon patients the necessity for samples of urine being prepared for the post strictly in accordance with the conditions laid down.

Correspondence.

MORTALITY FROM APPENDICECTOMY.

SIR: The letter of Dr. A. L. J. Peters in your issue of December 29, 1934, seems to me to call for some reply on behalf of the collectively inarticulate mass of country general practitioners who hold the degrees of M.B., B.S. To Dr. Peters it would appear a national scandal that anyone holding no higher degrees should presume to perform major surgical operations. I should be the last to deny that there are in the profession incompetent operators, but I hardly think that they are so common as to justify such sweeping condemnation of general practitioners in general as Dr. Peters metes out.

Permit me to quote my own case, since I know that it is in no way different from that of any man leaving the hospitals in which I obtained my experience. After graduating, I spent two years in general and special hospital work as junior and senior resident. During that period I saw, so far as my computation is correct, very nearly one thousand major operations and assisted at half of them. I myself performed, usually under capable direction, between fifty and sixty. Such experience entitles no man to call himself a practising surgeon, but it gives anyone with ordinary ability to profit by it reasonable judgement and skill to deal with the surgical emergency that is always likely to crop up in country practice, be it perforated appendix, ruptured ectopic gestation, or limb for amputation; for these (and others), when the nearest practising surgeon is sixty or seventy miles away over worse than doubtful roads, must be dealt with by the man on the spot. If he can obtain a colleague from twenty-five or thirty miles away to give the anæsthetic, so much the better; if not, he must proceed alone, using local, spinal or rectal anæsthesia as his preference and the necessities of the case dictate. If the surgical exploits of the general practitioner are to be reserved for occasions such as these, so much the worse for the patients on whom he is obliged to operate.

Fellows of the Royal Australasian College of Surgeons are *raræ aves* in country districts of this State. How many of them would be prepared to undertake a trip of 60 miles in any weather, perform any necessary operation, and be content with a fee of about 25% of that set out in the British Medical Association schedule?

The logical alternative for those of them who decline the pleasure is to settle themselves at strategic points throughout the State (of course, doing nothing but surgical operations—no maternity work, sore toes, colds in the head, or anything so humdrum), and earn thereby the gratitude of the farming community and about three hundred pounds *per annum* each.

Dr. Peters dons San Benito and makes his obeisance to the College of Surgeons. The reason therefor does not appear very clearly in his letter. Two appendices per thousand *per annum* hardly give sufficient scope for the worst surgeon to ruin his reputation and convince Dr. Peters in the process that a plain degree and surgical competence are incompatible.

The recommendation in Dr. Peters's concluding paragraph merits some consideration. Yet does it seem likely that any man would be satisfied to commence practice with "half a degree"?

For as such would his qualifications be stigmatized by his opponents and the local gossip-mongers. His efforts to make a living in the country or even to save his face would be comical.

So that Dr. Peters's suggestion amounts to a proposal to increase the length of the medical course by a considerable number of years; unquestionably this would be to the ultimate benefit of the community, provided enough of the starters in the course were able to last the distance financially to insure that the supply kept pace with demand.

Yours, etc.,

D. MCGOWAN STEELE, M.B., B.S.

Pyramid Hill,
Victoria,
January 8, 1935.

SIR: Dr. Peters is rather sceptical about the figures (in round numbers) that I mentioned in my original letter, so I am amplifying them in this communication. They will show, I think, among other things, that Dr. Peters's estimate of the incidence of acute appendicitis in his own district, namely two per thousand *per annum*, is low compared with our experience here. Also, all cases referred to are acute and in nearly every instance were the subject of a consultation. Our shire and town population is 4,000 and other hospital towns are, respectively, 54, 50, 35, 30 and 25 miles distant. I have gone into the figures of my partner, Dr. J. S. Le Fevre, over a twenty-seven year period, and find the highest number of acute cases in one year to be 75 and the lowest 20, averaging about 40. No considerations like "times of stress" and "young M.B., B.S.'s being up against it to make a living" *et cetera*, can be said to enter into the diagnosis, at least for the first twenty years of this period, for during that time no surgery was done here—every case went to other towns or the city for operation; not even an anæsthetic fee

was forthcoming for these cases. Of the total in this series, five died. One died after refusing operation, two died after operation in metropolitan hospitals by well known surgeons, and two died after operation in other country hospitals. There were no deaths in the latter seven years of the period, and these cases form part of the series mentioned in my earlier letter, and part belongs to other practitioners.

I have obtained, from the respective hospitals, the figures for last year at Young, thirty miles away. At the Sacred Heart Hospital and the District Hospital a total of 91 cases were operated on with no deaths. Being in close touch with these hospitals over a period of fifteen years, I can say it would be typical. Indeed, to my knowledge, there was but one death after operation for this disease in that period there. Six men are represented in the figures, and the hospital district population would be 8,000. It might be pertinent to ask: "Who, then, is killing them off in such large numbers?" You cannot do it in the country and get away with it. The reaction of the relatives after a death following operation by a well known surgeon is one of benevolent resignation. The same sad event in the case of a less well known man is often remorseful, notwithstanding that the latter may have done all that was humanly possible. And the public must have faith in their family doctor's ability to do ordinary surgery skilfully, for do we not find an ever increasing amount of surgery being performed in our country hospitals and the Hospitals Commission improving their surgical units to the tune of hundreds of thousands of pounds yearly? Indeed, the Commission is insisting on all work that can be done in the country being done there.

I note with interest Dr. Peters's recantation respecting the College of Surgeons, but I would remind him that I was not attacking the College as such at all. Notwithstanding this, I have received several letters from prominent men in the city, commending the sentiments in my letter. One man, who is an eminent surgeon, and a Fellow, said that he thought the College had, in certain respects, failed in its objective. Be this as it may, I repeat that if the College members are serious about this question of improving the standard of surgical technique, then let them give their residents in large hospitals a chance to acquire judgement and dexterity under expert guidance whilst they are in a keen receptive frame of mind. I know this can be easily managed from my own experience of 60 major operations and 100 tonsil dissections, under the tutelage of senior surgeons; but it would appear that this is quite atypical of the average resident's experience.

But whatever happens, do let us be spared the ordeal of a newspaper controversy respecting the fate of our little vermiform friend! Those zealous lay Press champions, going forth to battle in the maternal mortality campaign, have not improved the position one iota. Instead, it seems, they are helping to add a fear-neurosis to the other factors influencing the issue. By the way, the "G.P." can hold his own in this field too, but that is another story.

Yours, etc.,

BERTRAND COOK.

Boorowa,
New South Wales,
January 12, 1935.

ALLERGY IN OTO-RHINO-LARYNGOLOGICAL PRACTICE.

SIR: I should like to state that I entirely agree with the views expressed by Mr. Keith Watkins in his article on "Allergy in Oto-Rhino-Laryngological Practice", THE MEDICAL JOURNAL OF AUSTRALIA, December 22, 1934.

At the Australasian Medical Congress, Hobart, 1934, I read a paper entitled, "Allergy and the Rhinologist", in which attention was drawn to the prevalence in Australia of nasal allergic manifestations, apart from the obvious hay fevers, and to the futility of surgical treatment of certain conditions in which allergy was the primary causative factor. An abstract of this paper appeared in a congress number of THE MEDICAL JOURNAL OF AUSTRALIA, February, 1934.

I have since been able to further demonstrate that, not infrequently, the swelling in the mucosa of sinuses apparent in X ray films and reported by the radiologist as "gross mucosal hypertrophy", is merely a transient œdema, independent of bacterial infection, and that it can be experimentally induced by the appropriate allergen in some sensitized patients.

In regard to polypus formation, the investigations of polyposis carried out at different times by Lack, Woak, Hajek and others lead to the belief that polyposis is due primarily to bacterial infection. It has to be admitted that many cases of gross polyposis are associated with true inflammation of mucosa and underlying bone, but I am not aware of any scientific proof that bacterial infection is the primary cause and is not merely superadded to a mucosa already affected by allergic changes. I maintain that from clinical observations one cannot be satisfied with the conception that nasal polypi result primarily from bacterial infection of nasal sinuses. In the majority of frankly purulent sinuses one finds no polyposis present and, on the other hand, one not infrequently finds well developed polypi in sinuses which show no clinical evidence of inflammation.

Children are particularly prone to allergic upsets. With time and without local treatment tolerance is often established. In many cases regarded as allergic the advice that the child would be likely to grow out of the trouble has proved to be sound.

Overlooking the allergic factor, if present, has certainly been responsible for a good measure of disappointment with the result of nasal operations to both patient and surgeon.

Yours, etc.,

BRYAN FOSTER.

61 Collins Street,
Melbourne,
January 12, 1935.

SIR: In his paper on "Allergy in Oto-Rhino-Laryngological Practice", Dr. Keith Watkins stresses the great importance of this factor in many cases of nasal disease. The comparative commonness of vasomotor rhinitis due to extrinsic factors, such as dusts, was first pointed out to me by Dr. Bryan Foster in 1926, and it was again stressed in papers read by us at the Australasian Medical Congress at Hobart in January, 1934.

I have become convinced that it is a really important cause which can be easily overlooked. Dr. Watkins's description of the condition is excellent, but perhaps he should have emphasized more clearly two characteristics of disease due to "extrinsic" causes, namely, that symptoms will vary with changes of locality or changes of season. If no such variation is noted it is rather unlikely that external factors are of much importance, although there are some exceptions to this. On the other hand, careful inquiry should always be made regarding such variations in cases of chronic nasal trouble, and if they do occur investigation to identify the cause should be instituted. It is often worth sending the patient away for a few weeks' holiday, if there is much doubt. In cases of grass pollen sensitiveness, symptoms usually occur in Victoria between September and February, and these patients are usually "cured" temporarily if they live right on the seashore, where pollen is scarce. Conversely, they are much worse if they leave the city and go to the hills in the early summer. Patients sensitive to house dust, feathers, kapok and other perennial factors notice very little seasonable variation, but are often relatively free of symptoms in some mountain resorts. It is interesting that many of these patients are free of symptoms in hospitals, where house dust is less plentiful.

It should also be remembered that an X ray will often show "gross mucosal hypertrophy" during an exacerbation of the allergic condition. Apart from submitting the patient to the hardship of an unnecessary operation there is a real danger associated with operations on "allergic" noses.

In an appreciable number of cases a most intractable form of asthma, which we seem powerless to control, appears within a few months of operation. Dr. Foster has reported several such cases, and each year I meet several new cases of this sort. One might almost say that it is unfortunate that surgical interference in the nose will sometimes cause asthma and hay fever to disappear. My experience is that it sometimes affords relief for perhaps eighteen months, and that then the patient is as bad as ever, but it is obvious that one is much more likely to hear of failures than successes. Once a patient is "cured" he ceases to bother about doctors, whereas the "failure" is likely to wander from doctor to doctor for years.

Yours, etc.,

CHARLES SUTHERLAND.

71 Collins Street,
Melbourne, C.1,
Undated.

MATERNAL MORTALITY.

SIR: Dr. Halford in his letter of the 17th *ultimo* refers to the American conclusion that the unknown quantity which maintains the incidence of puerperal sepsis may be "droplet infection spread by doctors and nurses". I would add "and also fellow patients".

While waiting in the hall of a midwifery hospital I could not fail to notice that patients, walking about to excite their pains, and convalescent patients were allowed to use a common lavatory. The only two patients I had in this hospital ran a temperature of 103° for about a week. Soon after, a universal epidemic of septicæmia occurred, several women died, and the hospital was closed. In some matters there seems to be a barrier between the technical and common sense aspects of the medical imagination. Though this weakness in obstetrical organization exists, how horrified the *accoucheur* would be if the attendant nurse greeted him with the statement: "I have taken a representative culture of the leucorrhœa and lochia of the patients in the hospital and applied it, sir, to the circumferential area of skin around the vaginal outlet"! More especially should he be anxious if some of these patients were streptococcal carriers, as the result of an earlier septic abortion or of cervical erosion and ulceration, towards which immunity might have been established in the host, but not in the case of the victim. If, to complete asepsis, there were added full antisepsis, I think puerperal infection could be practically reduced to nil. My experience is that no organisms can live in the presence of one in 1,000 biniodide of mercury. And if half an ounce of this were placed in the vagina as a prelude to the initial instrumental interference, and the hands of the operator and less absorptive parts of the patient were kept free from contamination by this agent, most of the septic sequelæ of midwifery could be avoided.

Yours, etc.,

"PROPHYLAXIS."

Melbourne,
January 8, 1935.

HOSPITAL PRACTICE IN NEW SOUTH WALES.

SIR: In your journal of January 12, 1935, appears a letter from Dr. Dark, of Katoomba, *re* the workings of the *Hospital Act*.

Enclosed is a copy of a letter sent to our local branch secretary, Dr. Robertson, of Albury, on November 4, 1934; and I would ask all medical officers of public hospitals to work for the repeal of these obnoxious clauses. At present our work at the Corowa Hospital is straight-out "sweating", and no Government should be guilty of such conduct.

A large portion of our income is derived from small fees charged to these patients, and in the country it is practically necessary to send our patients to a hospital.

Yours, etc.,

I. FOX BARNARD, M.B., Ch.B.

Corowa,
New South Wales,
January 17, 1935.

Dear Dr. Robertson,

The enclosed cutting his appeared in the local press *re* admission and charges to patients in the Corowa Hospital. The effect of Section 8 is that no patient can be charged medical fees unless he is paying more than 49s. per week to the hospital; and 85% of our patients in the Corowa Hospital pay less than 49s. per week. So we are called upon:

1. To attend all indigent (non-paying) patients free of charge.
2. All patients paying up to 49s. per week free of charge (the Commission asserting its right to charge such patients, but denying the same right to the medical officers).

As secretary of our local branch of the British Medical Association I should ask you to approach the Parent Association with a view to having this clause (Section 8) deleted and the principle asserted that: "If any charges are made to patients in public hospitals, then the medical officer shall be free to make his own arrangements as to fees with such patients."

After serving the Corowa Hospital for 20 years at a salary of £75 *per annum*, the Hospitals Commission warns the Committee of the Corowa Hospital that their subsidy will be curtailed a similar amount if they continue paying their medical officer such salary. Personally I am of opinion that we should not be expected "to relieve the Government of its duty of attending to the sick poor", without some payment for such services; and in our case we attend the poor of Corowa, Rutherglen and Yarrawonga; and I ask the British Medical Association to approach the Hospitals Commission with a view to such salary being retained or, better still, increased.

Yours faithfully,

I. FOX BARNARD, M.B., Ch.B.,
Medical Officer, Corowa Hospital.

[Dr. Barnard, in referring to the local branch of the British Medical Association, probably means the local medical association; the words "Parent Association" are probably intended to indicate the New South Wales Branch of the British Medical Association.—EDITOR.]

University Intelligence.

THE UNIVERSITY OF MELBOURNE.

THE University of Melbourne will have during the current year the sum of at least £1,100 available for cancer research. Persons needing assistance for the prosecution of cancer research work are invited to communicate with the Registrar of the University, giving full particulars of their work.

Books Received.

THE HEART VISIBLE: A CLINICAL STUDY IN CARDIO-VASCULAR ROENTGENOLOGY IN HEALTH AND DISEASE, by J. Polevski, M.D.; 1934. Philadelphia: F. A. Davis Company. Royal 8vo., pp. 224, with illustrations. Price: $5.00 net.

Diary for the Month.

FEB. 5.—Tasmanian Branch, B.M.A.: Council.
FEB. 5.—New South Wales Branch, B.M.A.: Organization and Science Committee.
FEB. 6.—Western Australian Branch, B.M.A.: Council.
FEB. 6.—Victorian Branch, B.M.A.: Branch.
FEB. 7.—South Australian Branch, B.M.A.: Council.
FEB. 8.—Queensland Branch, B.M.A.: Council.
FEB. 12.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
FEB. 12.—Tasmanian Branch, B.M.A.: Branch.
FEB. 19.—New South Wales Branch, B.M.A.: Ethics Committee.
FEB. 19.—Tasmanian Branch, B.M.A.: Council.
FEB. 22.—Queensland Branch, B.M.A.: Council.
FEB. 26.—New South Wales Branch, B.M.A.: Medical Politics Committee.
FEB. 27.—Victorian Branch, B.M.A.: Council.

Medical Appointments.

Dr. A. H. Guymer (B.M.A.) has been appointed, pursuant to the provisions of the *Workers' Compensation Act*, 1928, a Certifying Medical Practitioner at Ballarat, Victoria.

* * *

Dr. J. Searls (B.M.A.) has been appointed, pursuant to the provisions of the *Workers' Compensation Act*, 1928, a Certifying Medical Practitioner at Bairnsdale, Victoria.

* * *

Dr. W. E. MacMillen has been appointed, pursuant to the provisions of the *Workers' Compensation Act*, 1928, a Certifying Medical Practitioner and Medical Referee at Mildura, Victoria.

* * *

Dr. H. G. Wallace (B.M.A.) has been appointed a member of the Advisory Committee for the purposes of the *Pure Food Act*, 1908, New South Wales, in accordance with the provisions of Section 6 (2) of the said Act.

* * *

Dr. C. A. Finlayson (B.M.A.) has been appointed Honorary Relieving Medical Officer and Honorary Pathologist to the Mareeba Babies' Hospital, South Australia.

* * *

Dr. A. H. Hart (B.M.A.) has been appointed Government Medical Officer at Queanbeyan, New South Wales.

* * *

Dr. B. M. Carruthers has been appointed an Official Visitor to the Mental Hospital, New Norfolk, Tasmania, under the provisions of the *Insane Persons' Hospital Amendment Act*, 1885.

* * *

Dr. R. J. Long (B.M.A.) has been appointed Certifying Medical Practitioner at Williamstown, Victoria, pursuant to Section 11 of the *Factories and Shops Act*, 1928.

* * *

Dr. C. Cook (B.M.A.) has been appointed Medical Referee at Midland Junction, Western Australia, pursuant to *The Workers' Compensation Act*, 1912-1924.

Medical Appointments Vacant, etc.

FOR announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser", pages xv, xvi, xvii.

CHILDREN'S HOSPITAL (INCORPORATED), PERTH, WESTERN AUSTRALIA: Junior Resident Medical Officer.

DEPARTMENT OF PUBLIC HEALTH, WESTERN AUSTRALIA: Junior Resident Medical Officer.

LAUNCESTON PUBLIC HOSPITAL, LAUNCESTON, TASMANIA: Resident Medical Officers.

RENWICK HOSPITAL FOR INFANTS, SYDNEY, NEW SOUTH WALES: Resident Medical Officer.

SYDNEY HOSPITAL, SYDNEY, NEW SOUTH WALES: Honorary Relieving Assistant Ophthalmic Surgeon.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Brisbane Associate Friendly Societies' Medical Institute. Chillagoe Hospital. Members accepting LODGE appointment and those desiring to accept appointments to any COUNTRY HOSPITAL are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	Officer of Health, District Council of Elliston. All Lodge Appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (Wellington Division): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

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